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SELECTING MOTOR-DRIVEN CENTRIFUGAL PUMPS

Essential Points to Be Considered in Their Purchase and Installation for Small Water Works and Booster Service—Importance of Head Variations—Types of Pumps—Automatic Control.

By M. F. STEIN.*

The electric motor-driven centrifugal pump, especially in the smaller sizes, has certain sterling advantages, which should give it an important position in water works service, both for small towns and as "booster" or high service pumps in large cities. Some of these advantages are:

1. Simplicity in operation and low maintenance charges, due to absence of boilers or other auxiliaries and of valves, the minimum of moving parts, bearings and stuffing boxes, etc.
2. Ease of starting and stopping, which can be accomplished by an automatic device governed by the water level in a tank or reservoir.
3. Compactness and low first cost.

Unfortunately many installations result in disappointment, owing to the low efficiency obtained, rapid deterioration of machinery, or failure to operate automatically, which might have been avoided by observing a few simple considerations in the design of the plant and selection of machinery.

In selecting the pumps certain fundamental facts as to the theory of design must be clearly understood. Most important of these is the head-discharge relation or "characteristic" of the centrifugal pump. While, in the case of reciprocating pumps, a considerable variation in head merely calls for a corresponding variation in power and does not materially affect the efficiency; in the centrifugal pump the head pumped against, quantity discharged, power required and pump efficiency are all inter-related in a rather complex manner. Fig. 1 shows graphically these relations for a typical case. Should such a pump be operated against a head 20 per cent above rating, it will deliver only 67 per cent of its rated capacity, at 87 per cent of its rated efficiency. If operated against 80 per cent of the head for which it was designed, the capacity would be 120 per cent and the efficiency 91 per cent. It will be noted that after reaching a maximum, the efficiency falls off very rapidly. It therefore behooves the prospective purchaser to ascertain very carefully the total head against which the pump will have to operate. If other pumps are already engaged in the service, this can be done by accurate pressure readings on both the suction and discharge lines, with these pumps operating at the capacity of the proposed unit. Otherwise the difference in level between the point of suction and the point of discharge must be carefully measured and the friction losses, as determined from reliable tables, must be added thereto. The total head so determined should be clearly stated in the specifications and if the pump delivers into a tank or stand pipe in which the water level fluctuates, the maximum, minimum and average heads should be given.

If the pipe line leading from the pump to the tank or reservoir is of large size as compared with the pump discharge, there will be a momentary rise in pressure on starting, due to setting in motion of the large quantity of water in the pipe. The probable amount of this starting head must be carefully considered, as it must not exceed the head of impending delivery of the centrifugal pump.

The pump manufacturers should be required to submit with their bids the characteristic curves (similar to Fig. 1) of the proposed pumps, and give the efficiencies which they will guarantee at the maximum, minimum and average heads specified. It is well to require these guarantees to include motor losses or to be "from wire to water," assuming the pump and motor to be bought as a unit. After being installed, the unit should be tested if possible. This is readily done, if the pump discharges into a tank, by measuring the rise of water level therein for a period of several hours' pumping, obtaining the current consumption by means of difference in readings before and after the test on an accurate recording watt meter placed in the power line, and noting the total pressure pumped against at beginning and end of test by means of gauges on both the suction and discharge pipes.

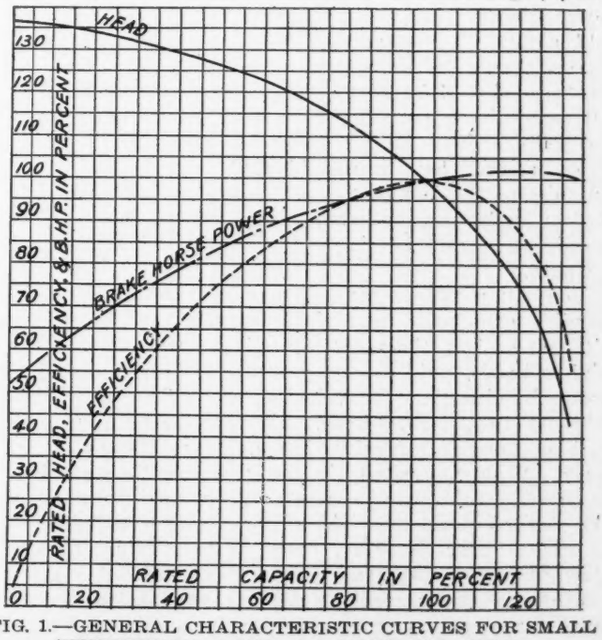

FIG. 1.—GENERAL CHARACTERISTIC CURVES FOR SMALL CENTRIFUGAL PUMP AT CONSTANT SPEED.

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The quantity of water is then obtained from the area of the tank and rise of water level, and the wire to water efficiency in per cent is determined from the formula:

$$\frac{\text{Gallons pumped x average head in feet}}{3169 \text{ x kilowatt hours}}$$

Fig. 2 is a compilation of the pump characteristics received with bids for a pump to deliver 350 gals. per minute against a total head varying from 95 to 105 feet and indicates what may be expected in the way of efficiencies and variation of capacity.

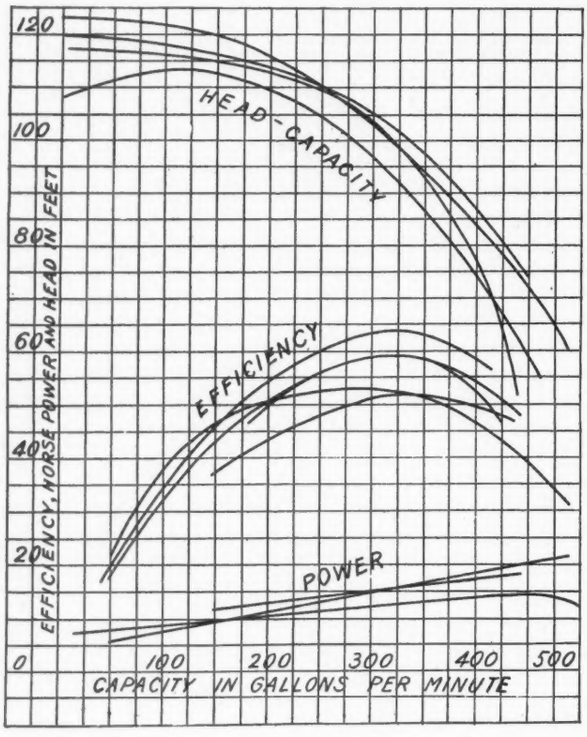


FIG. 2.—TYPICAL CHARACTERISTIC CURVES.
Received with competitive bids. Specified capacity, 350 gals. per min.; specified head, 95 to 105 ft. Speed, 1,200 to 1,800 r.p.m.

Having assured ourselves of an efficient installation, there remain the important questions of durability and reliability of operation. The pump and motor should be mounted in perfect alignment on a rigid cast iron bed plate. The connection between pump and motor shafts should be by means of a flxible coupling. All bearings should be of the ring oiling type with ample oil reservoirs, especially if the unit is to operate automatically. Thus, for a unit of 500,000 gallons per day capacity, each bearing should hold about 3 gills of oil. In spite of the fact that many pumps are claimed to be hydraulically balanced against end thrust, it is well to provide a thrust bearing on the pump shaft for this purpose.

The pump proper may be one of several types, depending principally upon the operating head. If this is 150 feet or less, the volute type is generally used. For higher heads, guide vanes are placed in the casing to assist in changing the velocity head of exit from the impeller to pressure head, this type being called the turbine pump. For high heads, several impellers are placd on the same shaft, the water passing through them in series, each impeller contributing an increment of the desired pressure. The proper design and proportioning of the impeller, both hydraulically and for strength, are most important. The enclosed type is almost exclusively used for water works service. In the smaller size pumps, it should be of bronze in preference to cast iron, as the water passages can be more accurately cast and finished more smoothly; further, if the pump is on intermittent service there is no danger of rusting or tuberculation, as would be the case with iron. It is well to remove the pump casing and examine the impeller and bearings before finally accepting the pump, especially if the price is suspiciously low. It sometimes happens that the impeller is extremely light, the thickness of metal at the periphery of the shrouds being as little as 1/16 inch, with the result that the impeller soon cracks under the high rotative strains occurring during operation. The impeller shaft in the better grade of pumps is generally covered with bronze wearing sleeves. The bearings should be separated from the stuffing boxes, so as to prevent the entrance of sand and grit. The stuffing boxes should be water sealed, particularly on the suction side of the pump.

The type of motor depends largely upon the kind of current available. Induction motors of the squirrel cage type are often used, as the pumps generally operate at one speed only. Variations in speed with corresponding changes in the head and capacity of the pump may be obtained by the use of slip ring motors. If it is desired to start and stop the pump automatically, the voltage should not be over 440 and preferably 220. With hand operation, motors built for voltages as high as 2,200 may be used, which will result in some economy, as transformer losses are eliminated. Motors bought under the standard specifications are satisfactory in every respect.

There are several types of apparatus on the market which will automatically start and stop the pump at certain predetermined water levels in a reservoir several miles away. Essentially these consist of a pressure gauge on the discharge side of the pump, with two electrical contacts. As the pressure from the reservoir falls the pointer of the gauge makes the lower contact, thereby actuating a solenoid which closes the motor circuit, causing the motor to start. To avoid a heavy rush of current as the motor starts, several resistances are interposed in the motor circuit which are automatically cut out as the motor assumes its load. When the gauge pointer touches the upper contact, the current to the motor is cut off by a reversal of the starting process. The greatest difficulty to the successful operation of this apparatus lies in the fact that, in starting, the pump must overcome the inertia of all the water in the pipe line leading to the reservoir, so that there is a momentary rise in pressure, which is generally sufficient to throw the gauge pointer against the upper contact, thereby stopping the motor and pump. Likewise, in stopping, an oscillating water hammer is set up in the pipe, which will raise the pressure at the gauge sufficiently to start the motor at each oscillation. An instance may be cited in which a pump operating against a total head of about 70 pounds was supposed to automatically start and stop so as to keep the water level in a tank about a half mile distant between two points 10 feet apart. The surges in starting and stopping caused rises and falls of pressure of 15 pounds, or over three times the working range.

Fig. 3 shows a device which will absorb the shocks of starting and stopping successfully. The gauge connection is made through a large air chamber, composed of a 10-foot piece of 6-inch wrought iron pipe, capped at both ends. This is kept about half full of air by means of an automobile tire pump. Needle valves on the inlet and outlet gauge connections still further restrict the flow in the gauge pipe. By using this device it is generally possible to regulate the water level in a reservoir between two points within a foot.

The contacts on the starting gauge are of course adjustable. The lower or starting contact is always set at the static pressure at which it is desired to start the pump. The upper or stopping contact must be set at

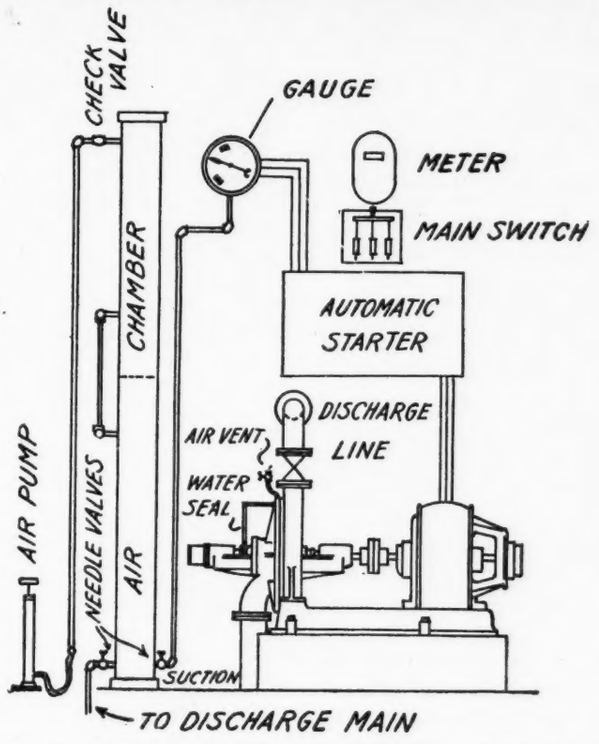


FIG. 3.—SHOCK ABSORBING DEVICE FOR AUTOMATIC STARTER.

a pressure corresponding to the maximum static pressure at which it is desired to have the reservoir stand, plus the friction loss between the pump and reservoir for that quantity of water which the pump will deliver against this combined static and friction head. As the pump discharge varies with the head, this can only be approximately determined by a series of trial computations in connection with the characteristic curves of the pump, and final adjustment must be made after the pump is in service.

PUMPING WATER BY ELECTRICITY*

First Cost and Operating Cost Lower Than With Steam Plants—Reliability of Motor—Securing Low Rate for Current.

Power can be produced more easily in one large power plant, located at a water power privilege or within easy reach of a coal supply, than in several smaller stations, to some of which coal may have to be hauled by wagons. The problem of electrifying a power plant becomes an analysis of the following items:

1. First cost of the equipment.
2. Cost of operation, including power repairs and labor.
3. Reliability of equipment.

A comparison of the purchase cost of steam and of electrically-driven pumps of the same capacity reveals the fact that the electric equipment costs from one-fourth to one-half that of the steam-driven units. Considering that for new installations a saving is also made in the first cost for boilers, buildings, etc., it certainly is fair to assume that the cost of the power plant portion of the water works equipment is reduced to one-fourth that for steam-driven stations.

The following table gives an average of 22 cities in Wisconsin from the reports of the Wisconsin Railway Commission. Figures from this table will be used to analyze the effect of the reduction:

Average Cost of New Water Works Systems in 22 Wisconsin Cities.

		Per cent of total cost, new.
1.	Land	3.10
2.	Wells, intakes and suctions	8.39
3.	Filters, reservoirs and standpipes	6.28
4.	Distribution system	63.75
5.	Power plant equipment	8.86
6.	Buildings and miscellaneous structures	6.37
7.	Office furniture, appliances, tools, etc	0.80

Adding together items 5 and 6 it may be seen that the total cost in power plant equipment and buildings represents 15.23 per cent of the total cost new of the equipment. Lowering this to one-fourth its present value by the use of electrically-driven machinery will effect a saving in the initial cost of

$$0.1523 \times 0.75 = 0.114$$

or 11.4 per cent. Taking the cost of operation, depreciation, etc., as 15 per cent of the cost new, this will affect the cost of operation by

$$0.15 \times 0.114 = 0.017$$

or 1.7 per cent of the present cost of operation of the steam-driven station. Therefore the fixed charges necessary to cover the initial investment are reduced by 1.7 per cent of that investment or, for the same income, there will be an increase in the annual profit of 1.7 per cent of the investment.

Items in the annual cost of operation which are less in the motor-driven station than for either steam or gasoline-driven pumps are the following:

1. Interest on investment as explained above.
2. Depreciation is less for the centrifugal pump and electric motor. In fact, depreciation is almost negligible if the motor is properly housed and cared for.
3. Cost of motor repairs is negligible in comparison with those for a steam or gasoline-driven unit on account of the absence of steam and heated gases and of reciprocating parts.
4. Cost of motor attendance may be made very small. If near the electric plant, the power company will furnish an attendant for the privilege of cutting off power at peak load times.
5. Practically no cost for lubricating oils.
6. Very low maintenance costs. The fires in a steam plant must be kept banked and ready to take on fire loads.

As a rule, the electric motor is more reliable than a steam engine. Instead of one large motor and pump, it is preferable that two or three be installed. When installing three, the combined capacity of any two should be able to supply the peak load. Throttling a centrifugal pump and running it below its speed lowers the efficiency.

When the pumping station is situated at some distance from the power plant, duplicate pole lines should be installed over routes widely separated. Fire in one quarter may destroy one pole line, but service can be maintained over the other. Proper lightning protection should be established at both ends of the transmission line to protect all electrical apparatus. The electrolytic lightning arrester, although its first cost is slightly higher, gives better protection and is the most reliable type now in use.

*From a paper by J. M. Bryant, Asst. Prof. of Elec. Eng., Univ. of Illinois, before the Illinois Water Supply Association.

The electric motor can be adapted to drive any type of pump. The greatest efficiency of mechanical transmission is of course secured by the least amount of gearing or belting. The centrifugal pump lends itself best for motor drive, since it runs most efficiently at the higher speeds. The squirrel cage induction motor, the wound rotor type or the synchronous motors may be used. By the proper use of the last, especially where the transmission line is long, a large saving may sometimes be made.

Electrical power for pumping should receive the lowest rate of nearly all classes of service furnished by a power plant. With water storage facilities capable of taking care of the peaks in the pumping demand and also supplying the water for the two or three hours when the commercial load on the power station is the greatest, the power for the pump may be supplied without any increase in the station maximum demand. The proper rate to be charged should be determined by a competent engineer or by the public utilities commission. The public utility and the city should cooperate and this co-operation should extend not only in the matter of securing rates but in the use and operation of equipment. Each part of the service should bear its proper portion of the fixed and variable charges.

"DISCONTINUED" WATER MAINS

Reasons Given by Fifty-eight Cities—To Enlarge Size or Replace Inferior Material with Cast Iron in Most Cases.

The standard waterworks forms of the American and New England Water Works Associations give as one of the items under the head of "Distribution Systems," "Length of mains discontinued during the year;" and figures under this heading were given in our tables of May 7. The meaning of this item is, we believe, generally understood by waterworks superintendents, although even to some of them it probably is not perfectly definite; but to certain others of our readers it may not be very clear. In order to throw some light on the meaning of this item, and also to obtain interesting information which would probably be connected with many instances of discontinuing lines, we asked a number of waterworks superintendents for information as to the reasons for discontinuance, and fifty-eight kindly replied—practically all of those questioned.

From these we find that in the majority of cases neither the line nor pipe was actually discontinued, but in fifty cities all or part of the amount so reported was really replaced with pipe of larger size. This replacing was due in some instances to the growth of the city necessitating carrying a feeder line to a new section; in others to the carrying out of a general policy to abandon all 4-inch, and in some cases all 6-inch, pipe which had previously been laid for larger sizes; and in a few cases by the replacing by larger pipe of very small galvanized pipe which had been laid as a temporary expedient.

In five Massachusetts cities all or part of the lines replaced were originally of cement-lined pipe which had been laid a number of years ago. Portland, Oregon, replaced galvanized pipe with larger ones, and also replaced both wood and steel pipes with cast iron, as did also Spokane, Wash.; and Seattle, Wash., replaced wood pipes with cast iron.

Four cities abandoned or took up lines in streets which were vacated. Washington, D. C., abandoned a line which had been laid years ago with iron pipe cast horizontally, and not considered worth using over again. Chicago, Ill., in replacing mains with larger ones, removes all pipe larger than 4-inch, but abandons 4-inch as not being worth the cost of removing it. Tulare, Cal., laid about twelve miles of cast iron pipe to provide for higher pressure which is placed on the system by booster pumps used for giving fire pressure. In four cases the grade or line of the street was changed, and the mains were taken up and relaid, in two cases with a larger size. [Possibly the most convincing reason given was that of Hamilton, Ohio, superintendent Nelson stating that the territory served by the mains which were abandoned was removed by the March flood of 1913.]

Some of the answers of more than usual interest were as follows:

Arlington and Concord, Mass., are removing cement-lined pipe. Town engineer George E. Ahern of the former states that this class of pipe was laid by them in 1872, and sections are occasionally bursting because unable to stand the pressure upon them, for which reason the Board of Public Works is replacing all such pipe with cast iron mains as fast as practicable. The abandoned cement mains are in most cases being used to carry the local reservoir supply which is used for irrigating and mercantile purposes only. Superintendent Leonard C. Robinson of Concord states that most of the mains discontinued in that city last season "were of the old type of wrought iron and cement pipe known as Knight-Bailey patent, the wrought iron in the 4-inch being No. 22 Birmingham gauge and in the 10-inch No. 17 Birmingham gauge. The greater part of this pipe was laid in 1874, and has been in constant use since that date. It gave excellent service up to the time that the street service was installed for fire protection; in fact, we have some of this sort of pipe which has been under 80 pounds pressure for the last three years and has given us very little trouble. We find that where the cement coating on the outside has not become cracked or injured so as to allow the wrought iron shell to rust out, this pipe will stand 100 pounds pressure."

Superintendent R. C. P. Coggeshall of New Bedford, Mass., writes that the majority of the pipe removed by him was 4-inch. "We still have some thirteen miles of 4-inch, which we consider too much, and therefore propose to gradually replace it from time to time with that of larger size. We are also engaged in encircling the city with 30-inch pipe. A section of this 30-inch pipe is being laid each year, last year replacing 10-inch and 8-inch pipe."

L. C. Wright, superintendent of the Northampton, Mass., waterworks, states that about 9,000 feet of 4 and 6-inch which had been in use forty years was replaced with 10 and 12-inch, a reason additional to the desire to increase the size being that the old pipe was nearly and in some places directly under the tracks of the street railway company and had been affected by electrolysis, which it was thought might be avoided by laying the new and larger pipes on the opposite side of the street, about 30 feet away from the original location.

North Platte, Neb., made a proposition to consumers in sections of the city not yet thickly built up, that the city would furnish 2-inch galvanized iron pipe to consumers if they would pay for all the labor of laying the same; the department giving them credit for the cost of this laying on the books of the department and furnishing water at the regular rates until the bill for water furnished equaled the credit, when the 2-inch pipe or main again became the property of the city. When the growth of the system makes it desirable, cast iron pipe

is substituted for this 2-inch galvanized pipe, and the latter is taken up and used in a similar way somewhere else. In this way the city has been able to make several thousand feet of temporary extensions and gain from 75 to 100 new consumers at small cost to the city.

The superintendent of Canton, Ohio, writes that the state laws require that before a street is paved a permanent water main be laid therein large enough to take care of future requirements—a practice in a great many cities and one which should become the standard in all.

Cincinnati, Ohio, states that when the old mains are found encrusted or covered with tubercles they are cleaned where the size exceeds 4-inch, but 3-inch and 4-inch mains are taken up and replaced with larger ones.

Spokane, Wash., finds several reasons for replacing mains. Wood and steel pipe are removed when they will no longer stand the pressure, and also whenever permanent pavement is to be laid, cast iron being substituted for them. Another reason is that many sections of land now in the city limits, but which were originally laid out as private properties outside the limits, are found to contain pipes which were not laid according to any system and which will not fit into the municipal system. Many are of wood, and these pipes are being gradually replaced with those of more permanent material and with sizes more consistent with the rest of the system.

Only two instances were given of the removal of cast iron pipe because of defective material. Superintendent W. A. McFarland states that in Washington, D. C., some old cast iron pipe is being removed which was cast horizontally, and is defective in that the inner and outer surfaces are not concentric. D. D. Clarke, engineer of the Portland, Oregon, water bureau, states that a length of about 4,000 feet of 24-inch cast iron pipe, which was laid over twenty years ago, has broken a number of times from some cause not satisfactorily explained, in several instances causing considerable damage to property. A contract having been let for repaving the street in which this pipe was laid, it was deemed an opportune time to replace this old main with one of better quality.

In San Diego, Cal., according to H. A. Whitney, hydraulic engineer of the water department, 18 to 24-inch wooden mains have been replaced with cast iron, because the wooden mains were continually leaking and giving trouble and were not considered a proper material for pipe within city limits where traffic is heavy. These wooden mains were put down twelve years ago, and are now being entirely abandoned. Two miles of 24-inch wooden mains are to be replaced with 30-inch cast iron because they are not tight and water in that country is too valuable to waste, and moreover the street in which they are laid is to be paved, and at present it is necessary to make frequent repairs to the wood pipe.

Thousands of feet of 2, 4, 6 and 8-inch pipe have been replaced with larger mains from 8 to 30 inches diameter on account of the growth of the city and increased demand for water. Mr. Whitney has prepared development maps showing the proposed future installations, and of what the replacements will consist. In making these maps, he divided the city into different districts, plotted therein the lines of existing pipes and then prepared plans for such additional mains as would be necessary. Estimates were then made of the cost of making these replacements and extensions, together with the valves and fittings, for each district, 12 per cent being added for overhead expenses. Whenever it is necessary to add a new main, a detail drawing is taken from the development map and the installation made accordingly. It will take years to perfect the system as planned; but when perfected, it will be a system and not a mere collection of miscellaneous unrelated lines of pipe. All the work of the department is done by bond issue or by money taken from the water receipts.

STREET LIGHTS IN HARTFORD.

Hartford was one of the first cities in the east to adopt the low voltage, nitrogen filled metallic filament lamps for street lighting in the business sections of the city and now has three and three-quarter miles of streets lighted with them. Lights are placed on both sides of the streets and staggered, the average spacing ranging from 112 feet on the principal streets to about 200 feet on less important streets. The lamps give not less than 300 mean lower hemispherical candle-power and not less than 300 candle-power in any direction at an angle of 20 degrees below the horizontal through the globe. Current is turned on 30 minutes after sunset and turned off 30 minutes after sunrise.

PEARL STREET, HARTFORD.

LIGHT STANDARD, HARTFORD.

There are 185 double lamp standards and 75 single lamp standards. These standards are of a design recommended by the Municipal Art Society for adoption, after receiving competitive designs. Chester D. Price of Montreal was the successful designer and Story and Stevens of New York were the contractors for the standards. Prof. Louis D. Bell of Boston acted as consulting lighting expert. The standard is of cast iron, 6 inches thick near the base and 4 inches at the top. The globes, which are acorn shaped and depolished, are 15 feet 4¼ inches above the ground. In the base, which extends up 1 foot 10¼ inches, is a handhole containing an emergency switch.

The city furnishes and owns the standards and the lighting contractors, the Hartford Electric Light Co., furnishes and maintains all the fixtures, keeping the standards painted and in good condition. A contract has been entered into for five years between the city and the electric light company, the cost per year for service and maintenance of the double standards being $80 and of the single standards $55.

The new lighting system has been in use several months now and has proved very satisfactory.

PURIFICATION OF WATER BY ULTRA-VIOLET RAYS*

Producing Ultra-Violet Rays and Effect on Germs—Measuring Bactericidal Power—Apparatus Employed—French Installations.

By M. von RECKLINGHAUSEN.

The treatment of water by artificial light sources for the purpose of destroying its germ life dates back to Downs and Blunt (1878). Marshall Ward in 1892 analyzed the effect of arc spectra thrown on infected agar plates and noticed that wherever these were struck by violet and particularly by ultra-violet rays they were disinfected and did not develop colonies. No practical use of this idea was possible until the invention of a powerful source of ultra-violet rays, which is found in the mercury arc lamp of the Cooper-Hewitt type for ultra-violet work. These mercury lamps are made of quartz rather than glass, since glass is nearly opaque to these rays. The so-called quartz lamps are made of fused quartz.

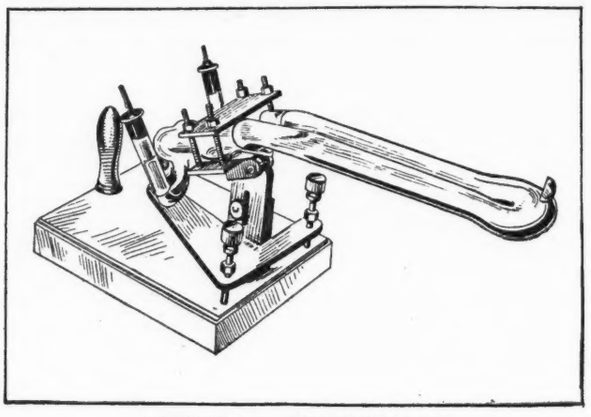
Repeated experiments have shown that germs exposed directly to ultra-violet rays at a distance of from one-half to one inch are killed in a small fraction of a second, and that if all parts of a given water can be brought into the zone of influence of such rays, all germs not in some way sheltered from the effect of the rays will be annihilated. There must be nothing in the water to intercept the rays, since even a smallest particle of suspended clay might intercept the ray from one or more germs. Color in the water also decreases its power very rapidly with the distance from the light source. It is therefore necessary that the water be as clear as possible. Therefore, it is in most cases necessary to filter the water before it is submitted to the action of the rays, and also desirable to free it from any coloring matter.

One of the advantages claimed for these rays is that the relative resistivities of the different bacteria against ultra-violet rays are much more uniform than against heat or disinfectants. Spores which are often twenty times as resistant as the unprotected forms of germs against chemicals are only one and a half to five times as resistant against ultra-violet light.

It has sometimes been thought that the bacterial action of the ultra-violet rays was due to a small amount of hydrogen peroxide which is formed in water by ultra-violet rays. This formation is so minute, however, as to be barely noticeable after ten hours' exposure of water, and it seems impossible that the bactericidal effect can be due to this. It is not likely that during a short period of exposure the entire bacteria could be chemically changed, but it is more probable that some ferment or similar product contained in the cell is modified by the rays and thereby poisons the system of the cell.

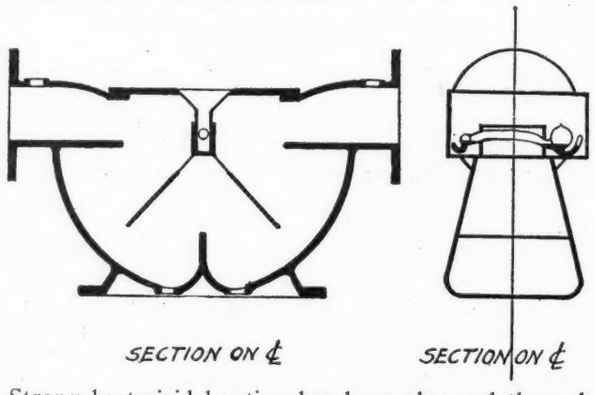
One of the early difficulties connected with the study of these rays was the securing of a method of determining the ultra-violet candle-power of a lamp. The rays are absolutely invisible to human eyes; moreover, for the work under discussion, the important feature was the bactericidal power, and a direct measurement of this seemed most desirable. The method employed by Mr. Recklinghausen is to make a culture of paramecias, which are very similar to ordinary water bacteria in their sensitivity to ultra-violet rays; as a matter of fact, they will stand about six times the exposure that B. Coli will. The sensitivity of such a culture is determined by exposing a drop of it at a defined distance from the laboratory standard quartz lamp. Another drop of it is exposed at the same distance from the lamp to be measured, and the time necessary for killing gives the indication of the relative value of the ultra-violet candle power of the two. Paramecias were chosen because they are easily discerned under a microscope and have a violent motion when alive and, of course, no motion when dead.

In order to obtain maximum effectiveness from the light it is necessary to so construct the lamps that practically all their light can enter the water. Numerous forms of lamp and setting have been devised, that used by the author in his experiments being the so-called pistol lamp, which has a U-shaped luminous tube inserted in a quartz tube which protects it from contact with the water; the name pistol being given because of a slight resemblance of the tube to that firearm. In order to insure as far as possible that every bacterium shall be brought under the influence of the rays, most apparatus designed causes the water to pass two or more times through the field of influence and to be more or less



SKETCH OF "PISTOL" LAMP.

agitated between exposures, so that a bacterium sheltered by a suspended particle during one exposure may not be sheltered during the others. The method of effecting this in most common use in France is shown by the author in the accompanying illustration. Here the water is carried past the lamp three times. The lamp is protected from contact with the water by inserting it into a chamber fitted with quartz windows, which chamber is submerged in the tank containing the water.



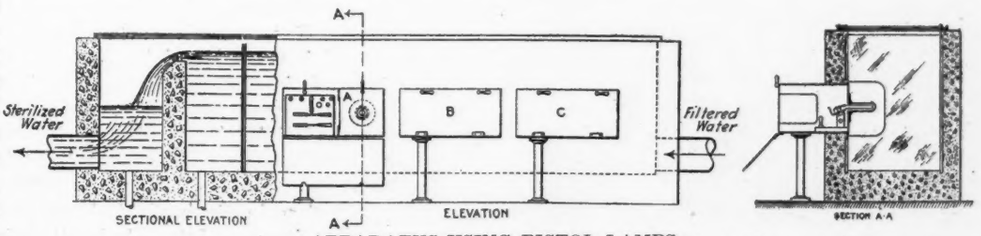
Strong bactericidal action has been observed through 3 feet of water, but this action is inversely as the square of the distance. Calculation and practice have shown that it is well to provide, if possible, 2 feet depth of water in small apparatus; while if the water is highly colored this should be reduced. Water which is without suspended matter, turbidity or color will require very little power of ultra-violet rays to render it sterile. The author believes that in large plants 50 k. w. h. per million gallons will produce a considerable overdose of ultra-

*Abstract from paper before American Water Works Association.

violet. He believes that where the water is not naturally physically ideal, it is more economical to supply a filtering plant which will place it as nearly as possible in this ideal condition, than to increase the power of the lamps. He believes that in large plants running twenty-four hours, the current consumption will vary between 30 and 125 k. w. h. per million gallons, according to the quality of the water, allowing a large coefficient of safety. The labor charges are negligible, as the apparatus needs only an occasional cleaning and starting of the lamps. Apart from this, the lamps have to be repumped and repaired from time to time. The coefficient of safety may be as high as is desired, since it is impossible to create any objectionable features in the water, like taste and odor, by overdosing.

The first large installation (150,000 gallons per day) of apparatus similar to that shown in the illustration, has been running since November, 1910, in a suburb of Rouen with very satisfactory results. A plant with four 220-volt pistol lamps has been running for over a year in St. Malo, sterilizing water at the rate of 750,000 gallons of water per day. Many pistol lamp systems are running in France, the largest containing ten 500-volt pistol lamps, sterilizing one and a half million gallons of river water for the city of Luneville, France. The water is extremely muddy, and is filtered through a rapid and slow sand filter without coagulants at the rate of 7 million gallons per acre. The author states that biological filtration through the filter could not be carried on at a greater rate than two and a half million gallons per acre. After filtration it contains at times as many as a thousand bacteria per c. c., but on leaving the sterilizer seldom has more than ten per c. c. and never B. Coli. The first application of the ultra-violet ray system for sterilizing water on a large scale in this country was started some weeks ago in New York, where the water of a swimming pool is continually circulated through a rapid filter and then subjected to two 220-volt pistol lamps. The flow is about 5,000 gallons an hour.

In discussing this paper Professor Dallyn stated that he thought the author was conservative in his claims; that the ultra-violet rays had been tried in his laboratory by students and they had obtained absolutely sterile water. The cost, however, he thought would be about three times that of disinfectants, a considerable item being the repair and replacing of the lamps. S. T. Powell had tried the rays in Baltimore, using city water in which B. Coli were often present, and had obtained almost sterile water with a short period of contact. He estimated that the cost would amount to $1.50 per million gallons for current alone and that depreciation would be high, as the lamps are fragile. The matter of cost he thought was the most serious obstacle to the use of ultra-violet rays. B. F Shaw found a complete absorption of the rays in 20 centimeters of Boston tap water with a color of 4. Concerning the method of measuring the sterilizing power of lamps, he doubted whether that suggested was accurate, as the results in his opinion would be very irregular. Mr. Recklinghausen presented figures to show that the sterilizing effect described in the test was not more irregular than many other chemical and physical tests conducted in laboratories, and believed it sufficiently accurate to serve as a means of comparison. As to the high cost of lamps caused by fragility, he stated that probably the speakers had drawn their conclusions from laboratory practice, and that in the laboratory lamps would break twenty times as often as in regular use because they were being continually handled, whereas in practice they might not be touched for days or weeks at a time.



APPARATUS USING PISTOL LAMPS.

WATER SUPPLIES IN KANSAS.

In a paper before the fifth annual convention of the League of Kansas Municipalities, R. E. McDonnell, C. E., of Kansas City, Mo., gave some information concerning waterworks in Kansas, from which the following statements are abstracted:

There are now in Kansas about one hundred and sixty waterworks plants, including those under construction. Of these all but ten per cent are municipally owned and the sixteen cities where the works are privately owned have experienced more or less agitation and litigation toward municipal ownership. Only a few states have a larger percentage of municipally owned water supplies, among these being Nebraska with eight private plants out of one hundred and fifty-five, and Oklahoma with only two out of one hundred and sixty.

In Kansas, in about 45 per cent of the cases the water is drawn from wells. The rest comes from springs, creeks, rivers and surface reservoirs.

The total investment in waterworks plants in the state is about eighteen millions of dollars, or about twenty-five dollars per capita for the urban population.

Kansas is largely underlaid with shale formation, which is compact and admits of but little storage of underground water. Only in western Kansas do we find much water available in wells, and the quantity there is small compared with the well waters of Iowa and Nebraska. A large majority of the cities must resort to streams or impounding reservoirs. The surplus rainfall, not being stored in the underground soil, soon runs out of the state through the rivers. To provide an adequate supply of water to cover long periods of drought, surface reservoirs can be constructed. Within a few miles of almost every city in Kansas are available sites for building reservoirs that would store millions of gallons that could be collected during the rainy season and drawn on during the dry.

Two most notable examples of such supplies in Kansas are at Osage City and Russell. Both have lakes formed by building dams. The water is filtered by modern filtration systems, securing an average purification of from 98 per cent to 99 per cent, including bacteria removal as well as sediment and color.

It is true that many towns have not had adequate funds to install a permanent water supply, and temporary measures are often forced upon a city until such time as the bonding power of the city enables them to secure permanent supplies. Cherryvale was an example of this sort. A temporary supply served the city ten years. When the city installed the temporary supply, it was either that or no water supply, as the city had exhausted its bonding power in buying the plant from a private corporation.

BREAK IN SPRINGFIELD SUPPLY MAIN

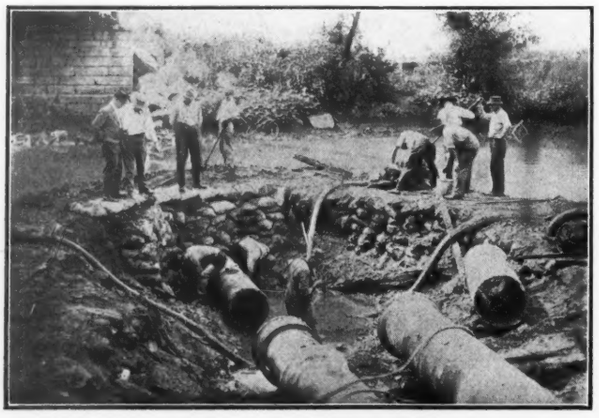
Repairing Break in Twenty-inch Creek Crossing—Pressure Maintained by Duplicate Supply Main—Desirability of Numerous Valves.

By GEORGE L. RINKLIFF.

The value of providing for duplicate mains between the source of supply and the distribution system, in the planning of water works construction, was recently demonstrated at Springfield, O., when one of the two supply lines leading into the city was dynamited. Although two sections of the main were shattered by the explosion and the damage done required considerable time for repairing, the pressure in the city mains was reduced for only a few hours, and the entire city was kept supplied with plenty of water, with the exception of the residents of a few blocks near the break, to whom the water supply was restored within thirty hours.

The main in which the break occurred was a twenty-inch line running into the eastern portion of the city from the north, and was originally the sole means of supplying the city. Within recent years the city erected a new pumping station a considerable distance from the old source of supply, and the twenty-inch main was extended to it, while a new twenty-four inch main was laid from the pumping station into the eastern portion of the city, connecting with the main arteries of the distribution system, making it possible to supply the city through either line.

The break in the main occurred on the evening of Sunday, June 28, and its effects were first noted at a fire station located in one of the highest sections of the city, where the indicator showed a sudden reduction of pressure. The matter was reported at once to the central fire station, and within the next few minutes similar reports were received from the captains of the other fire stations, showing that the entire city was affected. Chief S. F. Hunter of the fire department immediately notified the administrative deparment, from which orders were immediately issued to the heads of the water works, engineering and fire departments by city manager Charles E. Ashburner to organize forces for the purpose of locating the break. To the water works department was assigned the inspection of the main lines of the system, while the engineering department sent engineers and sewer men to the outlets of the sewers, with instructions to watch for an increased flow of water, and in the event such an increase was discovered to follow up the flow to the branches of the trunk line, until the break was located. To the fire department, instructions were given to have frequent reports made from all fire stations as to the reduction in pressure. It was hoped that a comparison of the data thus collected would indicate the section of the city in which the break was located.



REPAIRING 20-INCH MAIN IN LAGONDA CREEK.

The indicators showed that the first drop in pressure took place at 6:45 p. m. and that within twenty minutes later the pressure in the center of the city had declined from 80 to 15 pounds. By that time, acting under orders from the administrative department, the pumping station was operating at a full capacity of approximately 30,000,000 gallons per 24 hours, and there were no further declines in pressure excepting at the highest points.

Frequent reports from the different organizations covering various districts of the city failed to furnish any information indicating the location of the break. The indicators showed an almost uniform decline in pressure in every part of the city, while there was no increased flow in any of the sewers, and there were no surface indications of a break in any of the mains. The only remaining possibility in the minds of the department heads was that of a break in one of the main lines in the bed of Lagonda creek, which was crossed by both lines at different points.

Orders were sent to the pumping station to shut off the supply to the twenty-inch main, and a short time after there were slight increases in pressure reported from some of the indicators. This was at eleven o'clock, and the increase continued steadily for an hour, and by one o'clock the entire city, with the exception of a few blocks, had a full supply of water.

This indicated that the break had occurred in the twenty-inch main and the water works department closed all valves leading from it to the distributing mains. The next morning arrangements were made to cut in valves in the main on both sides of the stream. Within thirty hours from the time the break was first noted, the work on the valve on the city side of the stream was completed, and the water supply was restored to the residences which had been temporarily cut off. Next the valve was installed on the other side of the stream, after which work was commenced on a coffer dam around the break, which had been located by men diving to the bottom.

In constructing the coffer dam, cement sacks filled with sand were used and answered the purpose very satisfactorily. Two lengths of pipe were found to have been damaged by the blast and were replaced.

Three hundred sacks were used in the construction of the coffer dam, and twelve days were put in by the repair force before the water was again turned into the stream crossing and the apparatus removed to the creek bank.

Within a few hours after the conclusion of the work, a rise in the stream tore out the coffer dam.

The water in the part of the stream in which the coffer dam was located was six feet deep, and at that point the creek flows over a bed of water-bearing gravel. The flow of water under the bottom of the coffer dam was so large that three diaphragm pumps were kept going constantly to enable the workmen to stay on the job.

The total cost of repairing the break was $500.20, as shown by the progress report of the water works department.

For some time after the dynamiting of the main dead fish were found in the stream, indicating that violators of the fish and game laws had been at work along the stream.

While the results emphasize the wisdom of a duplicate system of supply lines in water works construction, the conditions met with in dealing with the situation in Springfield demonstrated the value of valves at frequent intervals in all mains. Had there been more

valves, it would have been possible to have supplied every water consumer in the city without inconvenience. Superintendent George S. Cotter of the water works department is now at work upon plans for installing valves in several parts of the distribution system which are now without a sufficient number.

RUMFORD'S NEW WATER SUPPLY.

On May 1, 1912, the Rumford and Mexico Water District, organized for the purpose, took over by condemnation the plants of the Rumford Falls Light and Water Company, the Viriginia Spring Water Company, and the Union Construction Company, which supplied the towns of Rumford and Mexico, Maine. The old supply was taken from a river and pumped to reservoirs, but the district's engineers recommended that the trustees abandon this source and obtain the supply by gravity from the watershed at Mt. Zircon, which has an area of 2.62 square miles and an admirable location for a storage reservoir. Work on this reservoir was let on March 31, 1913, to James M. McGregor of Rumford, and work was started immediately. The contract called for the completion of the work by November 1 of that year, but for various reasons, including lack of proper equipment, the work is just being completed at the present time.

The impounding dam is 800 feet long and 10 feet wide on the crest, and 220 feet wide at the deepest point, where the height is 61 feet. This embankment is provided with a concrete core wall which is built into solid ledge foundation in the center and westerly half, and is founded on hardpan in the eastern part. Thirty tons of steel rods are used to reinforce this wall.

The inner half of the embankment is composed of clay hardpan deposited in one-foot layers and thoroughly rolled with a 2-ton grooved roller; the slope being 3 to 1 up to a point 25 feet below the top and 2 to 1 for the balance of its height. The outer half is composed of a mixture of clay and loam, also deposited in layers and rolled, and has a slope of 1½ to 1. The outer slope is dressed with a covering of rich loam sodding. The entire inner slope is paved with heavy stone chinked with small stone and gravel. A gate house which rises from a point part way up the inner slope is reached by a foot bridge. It is circular in form, 10 feet inside diameter and 79 feet high from base to top of roof. It contains a 16-inch main valve, three 16-inch intake valves, a 24-inch blowoff valve and an 8-inch valve for draining the intake chamber.

The spillway is made by excavating into solid rock at the westerly end of the dam, from which a channel leads down the slope of the mountain to a point in the original stream bed 600 feet from the dam. It was originally intended to make this spillway 30 feet wide, but this was later increased to 40 feet after noting the effect of heavy showers on the runoff from the watershed.

The work included 6,800 cubic yards of stripping, 480 cubic yards of excavation for core wall, 31,300 cubic yards of hardpan embankment, 24,000 cubic yards of Class B embankment, 1,900 cubic yards of loam for the downstream face, 1,700 cubic yards of rock for paving the upstream face, 2,300 cubic yards of concrete in the core wall and 250 cubic yards of concrete in the gate house. The reservoir covers 24½ acres, all of which was stripped of vegetable matter and all stumps burned. All of the material used in the embankment was excavated from within the basin. The storage capacity of this reservoir is calculated to be 110 million gallons. The spillway is 340 feet above the center of the city and four miles distant.

The city also has a reservoir with a capacity of 6,500,000 gallons on the opposite side of the town and 119 feet lower. The difference of elevations of the two reservoirs requires that pressure reducing valves be used. When these are in service, the pressure will vary from 50 pounds to 110 pounds in different parts of the city; but in case of a severe fire, a bypass may be opened around the reducing valve and the pressure increased 55 pounds.

The contract price for the Mt. Zircon reservoir and the 14,223 feet of 12-inch pipe which connects it with the old system and includes 620 feet laid in the bed of the Androscoggin river, was $110,000, exclusive of the stripping and repairing of the basin, which cost about $10,000. The cost of condemning and taking over the three original companies was $235,432, and extensions were made last year costing $2,510. The trustees of the water district, to raise the money for these payments, sold 4 per cent bonds at 100.50. It is estimated that the present cost of running the pumping plant (which will be discontinued) is more than sufficient to pay the interest charges on the additional bond issue.

PRESSURE RECORDING GAUGES*

Uses Made of Them and Benefits Derived—Fuel Economy from Boiler Room Use—Recording Water Pressure Charts.

By J. M. DIVEN.

"A recording gauge on the steam line is the best possible check on the work of the fireman and engineer. If pumping to a reservoir under a constant load, the uniformity of the pressure line tells how uniformly the fires are being tended and the feed water applied. An absolutely even line would indicate perfection in the fire room; a ragged line, inattention on the part of the fireman. With properly kept boiler room records, the fireman's work can be accurately checked. A sudden drop in the pressure line should correspond exactly with the record of fires cleaned or boilers blown off. A quick drop or sudden rise at any other time indicates improper firing.

"With a direct pumping system, or where pressure has to be raised for fires, a less even steam line is to be expected; but a comparison of the steam and water charts will show how quickly the boiler responds to a sudden demand for more water pressure, by restoring and holding the pressure when the work of the pumping engine is suddenly increased. A direct pressure pumping system requires greater care and alertness on the part of the engineer and fireman, and the recording gauges are the best possible means of knowing how well they perform their work. Perfection would mean a line equal to one drawn with a compass or straight edge, according to the style of chart used, and the nearest approach to this indicates the best work. A ragged, zigzag line means inattention and carelessness, or something wrong with the boilers, steam lines, engines or pumps.

"A poor pressure line may not be the fault of the engineer or fireman; it may be due to poor fuel, a leaky or sagging steam line, bad feed water, poor draft, or engine trouble, but the engineer is just as much at fault for not promptly recording and reporting such troubles, as he would be for neglecting his work, or not keeping the fireman up to his part of it.

"If good pressure charts are obtained for a while, but constantly and uniformly get bad, it indicates either that the plant is wearing out or being overloaded. If both good steam and water charts are obtained when the plant is pumping say 5,000,000 gallons a day, and grow more and more ragged as the pumpage is in-

*Abstract of paper before American Water Works Association.

creased, they surely indicate that the pumps or boilers, or both, are being worked beyond their economic capacity. If the pressure lines grow in irregularity, when there is no increase in the work, they indicate that some part of the plant is wearing out or is in bad order and needs overhauling."

"The vacuum gauges should also be recording, to indicate the condition of the engines and pumps, a falling off in the height of the vacuum line indicating leaks that mean more coal. The lines on the vacuum gauge charts should not vary much. * * * If a higher vacuum is maintained with one kind of packing than with others, the one holding the high vacuum is the best, and probably the cheapest, though much higher priced than the others. The difference in cost might be made up many times in the saving of fuel."

"There should be a certain economical relation between the steam pressure and the water pressure. When this is worked out it should be as closely maintained as possible. An unnecessarily high steam pressure, even though it gives a very uniform gauge line, is not economical.

"On gravity supplies or pumping plants, in cities of considerable size, a gauge, or gauges, should be placed on the distribution mains at some central point, or at typical points. If more than one service, high and low service, each should have a recording gauge. It is well, when practicable, to take gauge services off of large or leading mains, where they will not be liable to the great fluctuations in pressure frequent on smaller distribution pipes.

"Of course there should be a gauge in the office, where it will be under the eye of the superintendent when in the office, and, at other times, of some other officer or employe of the water works, of the night watchman, if one is employed; one in the superintendent's house, for reference at night, is convenient, but, with telephone connections, not so necessary.

"The connection to the gauge should be entirely independent of all other service to the building in which it is located. It should be of good size, not less than ¾ inch, and placed where it will be in no danger of freezing.

"The gauge service should be so arranged as to be easily blown out or flushed, to avoid all possibility of stoppage by an accumulation of sediment. While a ¾-inch or larger service is recommended, the gauge operates with a very small opening; the object of the large service is to avoid stoppage."

The fire department stations are convenient places for recording gauges, and the fireman's interest in the water pressure is enough to insure proper attention. For municipal plants, police stations can be utilized, if they are better located than the fire engine houses, that is, on larger supply mains.

Charts should be permanently kept as a part of the records of the works; as part of the history of the plant. They should be conveniently filed for reference at any time. For straight line charts suitable albums or scrap books make a convenient file. For round charts the scrap book form, though suitable and convenient, is bulky, as a page would be required for each day's chart. Substantial pasteboard boxes of the right size to hold a year's charts are convenient. These can be labeled with the year, and, where several recording gauges are in use, with the location of the gauge, making it convenient to refer to the charts from any gauge at any time.

There is now an instrument for ascertaining from the pressure lines on circular charts, the style now mostly used, the average daily or weekly pressures. These results can be conveniently plotted, so as to show compactly the average pressures throughout a year, or many years. The plotting of two or more years on the same sheet, using different colored inks for the different years, shows compactly the comparative pressures for the equal seasons of each year.

Pressure recording gauges require little care, if daily charts are used, and they give the best records—daily changing of the charts, winding the clock and filling the pen, are all that is necessary. The supply pipe should be blown out occasionally to keep it clean, and the clock kept regulated, so that the time records will be accurate. This last item is important, should disputes arise concerning pressures at time of fires, particularly in towns where an increased fire pressure is required. The rise of the pressure line in the chart should correspond to the instant with the record of the fire alarm. In this connection some care must be exercised in placing the charts to see that they start on the correct time line.

The benefits of recording gauges are many; they have been known to stop law suits, where actions for damages caused by low pressure were threatened. The recording gauge settles many disputes concerning pressure at time of fires or other times. Often complaints of low pressure are made, not enough to supply the upper floors of some buildings. A nearby recording gauge demonstrates that it is a local trouble within the building.

The recording gauge charts show the effect of cold weather on the water supply, the low pressure lines on the chart in freezing weather indicate the extent to which water is being run to prevent freezing. They also reflect the hot weather use of water; a low pressure line on the chart at night tells of water allowed to run on lawns all night.

All parts of a city cannot at all times be covered by recording gauges, so that the story they have to tell is incomplete. Portable recording gauges set up in various places for short periods make a fairly complete record of the conditions of the supply at points on the distribution not covered by regularly established recording gauges. Such records in large buildings, factories, etc., where the fire hazard is great, are particularly useful.

FILTER PATENT DECISION.

In 1908 the New York Continental Jewell Filtration Company brought suit against the city of Harrisburg for infringement of its "negative head" patents in the filters built by the city in 1905. A year ago the U. S. Circuit Court affirmed the validity of the patent and its infringement by the city. (The decision was given in our issue of September 11, 1913.) The city, which was being aided in its defense by several other alleged infringers, appealed to the Circuit Court of Appeals, and that court on September 15th reversed the decision of the lower court by declaring that the city of Harrisburg has not infringed the patent, but does not declare that the patent itself either is or is not valid. The decision, therefore, appears to affect only the Harrisburg case and leaves the question of infringement by other cities as it was before the suit was started.

The patents have expired and do not, therefore, interfere with the use of negative head or down-draft tubes in future construction, and the question is one solely of collecting royalty for past uses. In order to do so, the company must probably bring suit against the other cities or water companies and prove both the validity of the patent (which the court of appeals is not convinced was proved, saying "the evidence in behalf of the company leaves us in much uncertainty whether the theories of the patents are sound") and the infringement in each case.

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SEPTEMBER 24, 1914.

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Factor of Safety in Water Works Plans.

Engineers are familiar with the use of the factor of safety (sometimes named, more or less facetiously, the factor of ignorance) in designing structures which make use of steel or other structural materials. There are other classes of calculations where its definite or admitted use is less common, but where it seems desirable to allow for a factor which may be more or less correctly called one of ignorance, or of insufficient information. Plans for a certain water works reservoir recently built were changed during construction by increasing the length of the spillway by thirty-three per cent, because of additional information furnished by a heavy rainfall on the watershed. How fortunate that downpour occurred last year rather than next! The Johnstown flood, one of the greatest catastrophes which has happened in this country, was caused by making the spillway of an unimportant earth dam too small to provide for an unusually heavy run-off.

Two weeks ago Frederic P. Stearns, in a committee report to the New England Water Works Association, gave figures showing that during the past six years the average run-off from the Wachusett drainage area had been but two-thirds that of the previous ten years, and that the highest yield during the later period was a little less than the lowest during the previous decade. Here again the phenomena surpassed previous records and suggested the need of a factor of safety in this class of problems also. The penalty of poor judgment is not so great as in the case of dam spillways, but it is sufficiently serious to make it of great importance.

In the case of structural materials, the factor of safety is used chiefly to guard against accidental deficiencies in strength of occasional pieces or an occasional load greater than was estimated. In the water works designs referred to, such a factor is required chiefly to provide against unprecedented natural phenomena—a higher rate of rainfall or a longer and more extreme drought than there are any records of. Text books tell us what factors are considered good practice in structural work, but we do not know that any values have ever been assigned for such water works problems as we have referred to. It would seem possible, however, for those who have made profound studies of the matter to suggest such factors. They would of course vary for different sections of the country and probably also with the number of years covered by the rainfall and run-off records. Safety against dam destruction or water shortage demands that allowance be made for the unprecedented, and the judgment of the inexperienced designer would be greatly assisted by some definite and tangible advice such as a factor of this kind would afford.

Motor Driven Pumps.

Two articles published this week discuss the subject of pumps driven by electric motors, in both of which the authors give certain very important advantages of this class of pumping machinery as compared to the more common direct-acting pumps. Each refers to the fact that such a plant is especially applicable to pumping comparatively small quantities of water, and especially where the pumping can be continued at a uniform rate or can be intermittently increased or decreased in order to adapt itself to other loads to which power plants may be subjected, such as street lighting or trolley service.

In considering the selection of pumps, it should be constantly borne in mind that there is no one kind of pump best under all conditions, and that the general conditions under which pumps of this kind are most economical and serviceable are those just mentioned, and also plants which are removed a long distance from railroads by which coal can be obtained, or those which it is desirable and practicable to have operate more or less automatically with practically no attention, such as small sewage lifts. In general, the loss in energy between steam boiler and pump is greater where the power must first be converted in to electricity than where it is applied directly to a steam pump.

There may, however, be conditions under which electric operation of even comparatively large pumping plants may be more economical than the direct use of the steam. That which we have specially in mind is the case of a power plant which has a few hours each day of high peak load, and a number of hours during which the load falls off to a small percentage of this; combined with the possession by the city of large distributing reservoirs which permit the pumps to operate for filling these during whatever part of the day may be most convenient, the reservoirs furnishing the water supply without the assistance of the pumps during the hours of peak electric load. Under such condition, any work obtained by using the pumping plant is, perhaps, 50 per cent pure gain, as otherwise the plant would be lying idle with all overhead expenses and a considerable part of the fuel expense continuing as great as though the pumping plant were not being operated.

EXTERNAL CORROSION OF CAST IRON PIPE

Such Pipe Good for Several Hundred Years Under Most Conditions—Corrosion in Salt Swamps—Preventive Methods.

(Abstract of paper by Marshall R. Pugh before the American Society of Civil Engineers).

The ancients were unacquainted with cast iron pipe as the art of casting iron was unknown until the 14th or 15th century, stone, wood and lead pipes being used previous to that time. The earliest records of cast iron pipes that appear to be authentic relate to various sizes laid in Paris. These pipes have been in use 226 years to 250 years and are still serviceable. They are one meter in length, joined by means of bolted flanges. The few repairs required have been necessitated by the rusting out of the flange bolts. Other cast iron pipes, notably those in London, Glasgow and Philadelphia, have been in use over a hundred years and are still in good condition, some of them being used under a 200-foot head. Cast iron cannon sunk in the Delaware river for 40 years were perfectly free from rust when raised. Therefore it seems that an experience of 250 years with cast iron pipe has not been sufficiently long to establish its actual life.

It has been shown, however, that under certain conditions cast iron is not durable unless protected. It is, therefore, important to determine just what those conditions are and how to guard against them.

The salt water of the ocean is particularly destructive to cast iron, and its action is manifested in a peculiar way, differing materially from ordinary rusting, scaling and pitting. The cannon of the "Royal George," which had been submerged in the ocean for 62 years, and of the "Edgar," which had been similarly submerged 133 years, were found to have become so soft that the metal, which resembled plumbago in appearance, could be cut with a knife. The cannon hardened gradually in air and were later used again.

Salt water has been found to act similarly on cast iron pipes. At Elizabeth, New Jersey, two miles of 6-inch ordinary coated cast iron water main, about 0.45 inch thick, was laid 8 inches below the surface of a salt marsh, which was about 18 inches above ordinary high water, and therefore covered at times by salt water. The nearest trolley is three miles away and therefore has nothing to do with the observed deterioration of the pipe. Seven years after it was laid, the pipe began breaking under a pressure of 50 pounds, and it became necessary three years later to renew the whole line.

Internally the pipe was in good condition, and the external appearance was equally good, but in many places large spots were found where the iron could be cut like soft graphite, which it strongly resembled in appearance. The action was not regular, sometimes skipping several feet, but was most noticeable at the bottom. In some instances these soft places had been eaten completely through the walls of the pipe, which, though not pitted, had lost all characteristics of iron. On exposure to air, this metamorphosed iron hardened, just as the cannon had done.

At Perth Amboy, N. J., a 16-inch water main crossing a salt meadow for some 3,500 feet had to be abandoned in less than twenty years. A second main, laid alongside the first, showed evidences of deterioration after seven years and was then uncovered and left exposed to the air and water. The pipe was laid in a black meadow muck from which salt grass is cut and was buried with 3 feet of cover. The meadow is completely submerged at extreme tides with an ordinary range of 4 feet. As in the Elizabeth pipe, the exterior did not pit, but deterioration occurred from softening in spots, which finally blew out.

The water supply of Atlantic City, N. J., is delivered to the city by mains leading through salt marsh for a distance of 22,000 feet. In 1882, a 12-inch cast iron main was laid, which, in 1888, was paralleled by a 20-inch cast iron main, and in 1901 a 30-inch steel main was laid alongside the others. Both cast iron mains are soft in spots and blow out from time to time under a normal pressure of 50 pounds. The steel main is even less satisfactory and, though laid at a later date, has 6,000 feet now out of service.

The same trouble was encountered at Richmond, Va., and in Syracuse, N. Y., there has been much trouble with cast iron pipe in the salt lands. Soil composed in the main of coal ashes also had a destructive effect on pipe in Syracuse. However, the alkali salts of the west have had no injurious effect on cast iron pipe as at Montrose, Colo., where they replaced wrought iron and wood stave pipes. The latter deteriorated rapidly, the binding wires coming apart.

There are two theories now held concerning corrosion. The acid theory regards corrosion as resulting from an acid, usually carbonic, which unites with the iron to form ferrous carbonate ($FeCO_3$) or the soluble ferrous hydrogen carbonate ($FeH_2[CO_3]_2$) and the liberated hydrogen combines with the free oxygen in the water to form more water. The oxygen of the air next converts the soluble iron salts into hydrated oxide or rust, liberating the CO2, which is free to attack more iron. The electrolytic theory regards the action as electro-chemical.

Magnesium and ammonium chlorides are found to corrode iron, even in the absence of air. Since sea water contains magnesium chloride, this gives a clue to the particularly destructive effects of sea water on cast iron. Carbonic acid, or even solutions of it or of other acids, also tend to corrode iron.

But it is noticeable that in most cases of bad pipe corrosion, not only was there salt water, aeration and more or less motion in the water, but the pipes were laid, as a rule, in muck, with rank swamp vegetation and life in close contact with the metal. The action of living matter, therefore, becomes a subject of interest.

The direct action of any organism is doubtful, although it is known that organisms do occur in the tubercules forming on the inside of water mains. But it is known that young roots, and especially root hairs, in addition to exhaling carbonic acid, excrete stronger acids or acid salts, by means of which they dissolve otherwise insoluble bodies; but our knowledge of the humic acids is very meagre. It is generally assumed, though, that they have an important part in the corrosive action of swampy waters.

Conditions inhibiting corrosion may be attained by using strong solutions of alkalis. Slaked lime is beneficial when iron posts or standards are set in the ground. Concrete forms a good protection for iron or steel. Silicon in the iron protects it from corrosion and is usually found in the outer skin of cast pipes that have not been machined or planed. Chromium, nickel and copper also give iron resistant properties.

Therefore, to prevent the external corrosion of the pipes, an improvement, if possible, of the skin resistance would be an aid. The use of lime in trenches so as to enclose the pipes in alkali is also worth trying. Another method suggested and tried at Perth Amboy is to leave the pipe in an open trench. At Atlantic City this principle was carried a step farther and the pipe elevated so as to be entirely in the air. At Elizabeth, the pipe was laid on the surface, covered with a mound of meadow grass, and then sodded.

Bearing in mind the protective effect of zinc, it might

at times be desirable to galvanize the iron in such locations, double galvanizing (which merely means an extra heavy coat) being used.

The conclusions reached are:

First—Under ordinary conditions of soil, cast iron pipe has a probable life of from one to three centuries, as far as external corrosion is concerned.

Second—Under certain soil conditions, such as salt marshes or saline soils, cast iron pipe may be rendered useless in from seven to twenty years.

Third—At times cinder and slag may exert a strongly deleterious influence.

Fourth—Substituting wrought iron or steel pipe for cast iron is ineffectual. Cast iron will outlast the others.

Fifth—Remedies fall under four heads:

(a) Increasing skin resistance of cast iron.

(b) Utlizing the protective effect of alkalis by surrounding the pipe with lime or cement, where possible.

(c) Exclusion of acids, salt or air.

(d) Galvanizing the cast iron pipe, thus protecting it at the expense of the zinc.

WATER PURIFICATION IN MARYLAND.

The chief of the Bureau of Sanitary Engineering of the Maryland Department of Health, Robert B. Morse, has sent us a list of the water supplies of that state which are using some form of purification treatment and those about to construct purification plants. This list is presumably complete for that state.

In our issue of July 23 we gave a list of over 300 cities whose water supplies were treated, but which list was probably complete for no state except New Jersey. We will be glad to publish complete lists for other states also, if furnished by the state health boards or officials.

MUNICIPAL WATER PURIFICATION PLANTS IN MARYLAND.
(Other than in Baltimore City.)

Place.	Ownership of Supply.	Source of Supply.	Treatment—Sand Filtration.	Treatment—Disinfection.
Baltimore County:				
Patapsco river..	Baltimore County	Surface.	Both slow & rapid..	Hypochlorite.
Herring river...	Water & Electric Co.	Surface.	.....	Hypochlorite & ozone.
Chestertown	Municipal.	Springs.	.....	Hypochlorite.
Cumberland	Municipal.	Surface.	Rapid.	Hypochlorite.
Ellicott City.....	Ellicott C'y Water Co.	Surface.	.....	Hypochlorite.
Hagerstown:				
Antietam creek..	Washington Coun-	Surface.	Rapid.	Hypochlorite.
Mountain	ty Water Co.	Surface.	.....	Liquid chlorine
Havre de Grace...	H. de G. Water Co.	Surface.	Rapid.	.....
Rockville	Municipal.	Tubular wells.	.....	Hypochlorite.
Ruxton	Ruxton Water Co.	Tubular well.	.....	Hypochlorite.
Sparrows Point....	Maryland Steel Co.	Tubular wells.	Rapid pressure.	Hypochlorite.
Takoma Park.....	Municipal.	Surface.	Rapid	.....
Union Bridge.....	Union B. Water Co.	Tubular wells.	.....	Liquid chlorine.
Westernport:				
Potomac river...	W. Va. Pulp & Paper Co.	Surface.	.....	Hypochlorite.
Savage river....	Municipal.	Surface.	.....	.....
PLANTS ABOUT TO BE BUILT.				
Elkton	Maryl'd Water Co.	Surface.	Rapid.	.....
Frederick	Municipal.	Surface.	.....	Liquid chlorine.
Laurel	Municipal.	Surface.	Rapid.	Hypochlorite.
Mount Rainier.....	Municipal.	Surface.	Rapid.	Hypochlorite.

ELECTRIC PLANT DATA.

Since compiling the tables published in our issue August 27, giving information concerning a large number of municipal and private lighting and power plants, we have received data from a few other cities, which we give in the supplementary tables on this and the following page. Figures concerning commercial light and power for several of these cities were given in the previous tables.

INFORMATION CONCERNING COMMERCIAL LIGHTING AND POWER.—MUNICIPAL PLANTS.

City.	Kind of lamp.	Number used.	Watts, amperes or candle-power.	Lighting Rates.* Maximum Rate. Maximum k.w.h. to which it applies.	Lighting Rates.* Maximum Rate. Cents per k.w.h.	Lighting Rates.* Minimum Rate. Minimum k.w.h. to which it applies.	Lighting Rates.* Minimum Rate. Cents per k.w.h.	Power Rates.* Maximum Rate. Cents per k.w.h.	Power Rates.* Maximum Rate. Maximum k.w.h. to which it applies.	Power Rates.* Minimum Rate. Minimum Cents per k.w.h.	Power Rates.* Minimum Rate. Minimum k.w.h. to which it applies.
California:											
Pasadena.....	Tungsten and Gem	....	25-80 w.	100	5	2,000	3	4	100	1.2	3,000
Santa Clara.....	.....	....	....	50	9	2,000	3	7	50	2	2,000
Illinois:											
Metropolis.....	.....	.....	.....	150	7½	550	3	7½	150	2	600
Rochelle.....	Tungsten	5,000	40 w.	...	10	....	..	10	...	3	....
Indiana:											
Mishawaka.....	.....	....	....	30	10	....	5.4	5.4	100	2.7	3,500
Michigan:											
St. Clair.....	.....	....	....	100	10	400	6	8	30	4	80
Minnesota:											
Brainerd.....	.....	13,500	40-60 w.	...	6½	...	6½	6	500	4	1,000
East Grand Forks.	Mazda and arc	3,500	....	250	7.2	625	6.4	6	...	6	....
Missouri:											
Fulton.....	.....	....	....	20	12	350	6	5	500	2	2,000
Pennsylvania:											
St. Clair.....	.....	2,479	8 c.p.-32 c.p.	...	8 a	....	..	8 a	...	..	....
Utah:											
Ephraim.....	.....	....	....	...	5	....	..	1½	...	..	....
Washington.											
Ellensburg.....	.....	....	....	10	9	300	4.5	5.7	100	0.85	20,000
Canada:											
Edmonton, Alta..	.....	....	.....	100	7⅛	2,200	5¼	5.4	150	1.8	5,000
Moose Jaw, Sask.	.....	....	3,762,000 kw.h. b	...	6.3 c	....	..	3.15	¾ h.p.	1⅛	100 h.p.

* The rates given are net, unless otherwise stated. a Special discounts.
b Total output for 1913.
c For current used between sunset and 11 P. M. For current used outside of those hours the rate is 2.7 cents. Additional meter rental, 25 cents per month.

INFORMATION CONCERNING STREET LIGHTING.—MUNICIPAL PLANTS.

City	Miles of streets lighted. Ordinary.	Intense.	Kind of lamp.	Number used.	Watts, amperes or candle-power.	Average useful life, hours.	Rate of payment by city. Per lamp, per year or per k.w.h.	Average distance between lights.	Height of lamp above street.	Method of supporting lamps.	Length of wire conduits in service.
California:											
Pasadena	150	..	Arc	216	6.6 amp.	....	$60.00	500	25	Mast arm	....
	..	..	Series tungsten	1,725	80 c.p. a	....	12.00	200-220	17	Gooseneck and single light column	....
	..	..	Ornamental	926	....	....	3c.-4.3c.	75	11	.....	....
Santa Clara	..	..	W. E. enclosed	62	6.6 amp.	90	$0.03	...	25-30	Centre span suspension	....
	..	..	G. E. mazda	14	100 c.p.	....	.03	...	20&25	Centre span and bracket arm	....
	..	..	Mazda	130	40 w.	....	.03	1/8 block	10	5-light electroliers	....
Illinois:											
Metropolis	28	..	Series	230	6.6 amp.	....	none	300	18	Bracket and span	....
Rochelle	10	1	Arc	54	6.5 amp.	....	....	600	20	Centre suspension	....
	..	..	Tungsten	216	40 & 60 w.	1,200	....	60	12	Ornamental posts	....
Louisiana:											
Natchitoches	8	..	G. E. mazda	53	....	800	$48.00	400	15	Brackets	....
	..	..	Arcs	15	....	....	120.00	400	18	Pole suspension	....
Michigan:											
St. Clair	..	..	G. E. enclosed	34	7.5 amp.	....	19.25	360	20-25	Span wire and mast arm	....
	..	..	Series mazda	18	7.5 amp.	....	19.25	360	20-25	Span wire and mast arm	....
	..	..	Multiple arc	10	100 w.	....	none	...	20-25	Gooseneck brackets	....
	..	..	Ornamental multiple	45	60 w.	....	none	90	12	5-light ornamental posts	700 ft. b
Minnesota:											
Brainerd	..	..	Westinghouse flame	86	4 amp.	....	$0.03½	2 blocks	20	Suspension	....
	..	..	Ornamental	385	60 w.	....	.03⅓	95	14	5-light ornamental standards	....
East Grand Forks.	6	¼	Mazda	242	60 w. to 500 w.	1,500	.05	350	12-22	Suspension wire and goosenecks	16 blocks b
Fairmont	18	..	Mazda	83	60 w.	1,200	18.00	300	12	Goosenecks	....
	..	..	Arcs	13	6.5 amp.	100	72.00	300	22	.....	....
Missouri:											
Fulton	..	..	Arc	20	6.6 amp.	....	none	...	..	.....	....
	..	..	Series mazda	150	4 amp.	....	none	...	.	.....	....
Pennsylvania:											
St. Clair	..	..	A.B.	86	....	....	....	...	..	.....	....
Utah:											
Ephraim	16	..	Tungsten	200	40 w.	....	....	300	16	Gooseneck	....
	..	..	Arc	16	6 amp.	....	....	600	16	Mast arm	....
Washington:											
Ellensburg	5	1	Arc	66	4 amp.	300	$0.03	500	20	Centre suspension	....
	..	..	Tungsten	20	4 amp.	3,000	....	...	..	.....	....
	..	..	.....	426	4 amp.	4,000	.03	100	12	3-light cluster poles	....
Canada:											
Edmonton, Alta...	..	2¼	Tungsten	359	60-200 c.p.	....	....	350	18-20	Brackets	....
	..	..	Westinghouse A.C. series	233	6.6 amp.	....	....	350	22	Mast arm	....
	..	..	Westinghouse magnetite	178	6.6 amp.	....	....	350	22	Mast arm	....
	..	..	G. E. magnetite	347	6.6 amp.	....	....	350	22	Mast arm	....
	..	..	G. E. inverted magnetite	262	6.6 amp.	....	....	80	15	Bracket, standard and stationary poles	....
Moose Jaw, Sask..	..	1¼	Magnetite arc	214	6.6 amp.	....	.02	350	22	Wood and steel poles	....
	..	..	Magnetite arc	29	6.6 amp.	....	.02	110	25	Ornamental steel poles	2¼ miles
	..	..	Tungsten	50	100 w. & 60 w.	....	.025	90	14 ft.	5-light cast-iron standards	....
					PRIVATE PLANTS.						
Illinois:											
Pinckneyville	..	..	Series tungsten	31	400 c.p.	....	$72.00	2 blocks	20	Poles with cable	....
Indiana:											
Sullivan	12	..	Westingh'se series met. flame	66	285 c.p.	300	60.00	1,000	30	Centre suspension	....
Ohio:											
Coshocton	..	..	G. E. magnetite	189	4 amp.	....	60.00	1 block	14	Brackets	....
Texas:											
San Angelo	..	..	Magnetite arc	24	4.4 amp.	....	95.00	...	..	.....	....
	..	..	Tungsten	90	60 w.	....	22.00	...	..	.....	....

a Average. b Underground cable.

The WEEK'S NEWS

Massachusetts' Mountain Road—Concrete Paving in Hartford, Conn., and Schenectady, N. Y.—Upper Michigan Highway System—Typhoid in Brooklyn, N. Y., and New Bedford, Mass.—Indiana Water Rates—Waterworks Improvements in Portland, Ore., and Rahway, N. J.—New Motor Vehicles for the Cities—The Finances of Boston, Mass.; Springfield, Mass.; and Los Angeles, Cal.—Commission Form—State Municipal Bureau—Garbage of Dayton, O., and Reading, Pa.

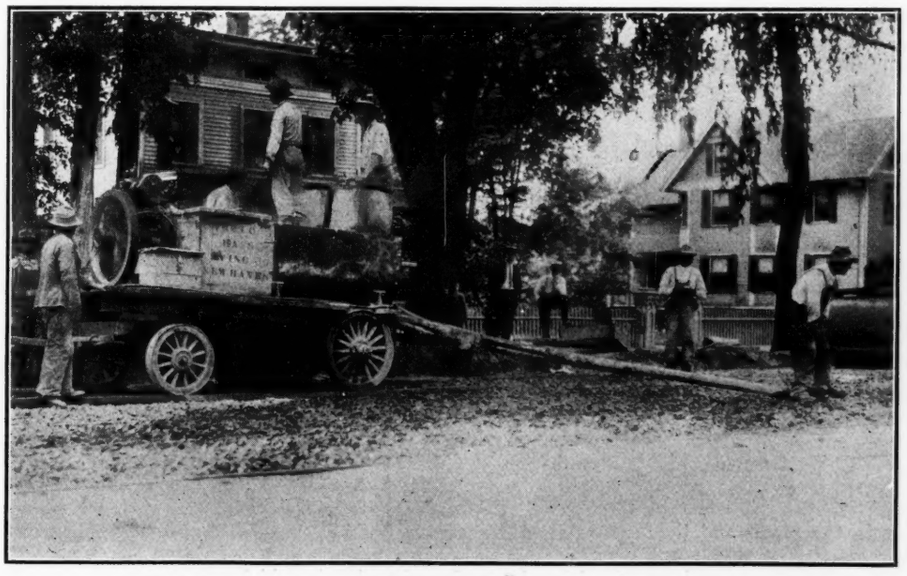
ROADS AND PAVEMENTS

New Massachusetts Mountain Road Open.

Boston, Mass.—The new Florida Mountain road has been opened to traffic. The Highway Commission for the past two years has been engaged in the construction of this piece of mountain highway that ranks as one of the most ambitious projects it has ever undertaken, and that has cost about $250,000. The 14-mile road links up Greenfield and North Adams. The citizens of North Adams agitated for a better road over Florida Mountain for a long time, coming to the legislature year after year, until at length they secured an appropriation for a survey by the Highway Commission. As yet the Florida Mountain route is only a dirt road, and, as practically the whole of it is new construction from the foundation to the surface, it probably will not be given a hard surface for a year or two. It is, however, an excellent dirt road with a maximum grade of only about 7 per cent.

Concrete Paving in Hartford.

Hartford, Conn.—Burnside avenue is being paved with concrete. Both sides of the street are paved with a dirt strip left on either side of the main travel path. The trolley company and the State Highway Department figure on sharing the cost with the town. The new stretch has a surface of concrete 6 inches thick. Instead of mixing the stone, cement and sand and water at one time, the stone is first placed on the road, and in order that it may be free from dirt it is lifted from the piles with large hand forks. A steam roller rolls down the stone. Then the concrete is applied. In a large mixer, operated by a gasoline engine, sand and cement are mixed and poured from two long telescoped tubes which form an exaggerated V at the rear of the mixer. At the outer ends of these tubes are round perforated drums. Immediately the mixture in the mixer is correct the liquid cement or concrete is discharged through these long telescope tubes. A workman, by means of a long iron hook, lifts the ends of the discharge pipes from place to place. The concrete runs out and fills in all the crevices. When a certain spot has filled up the discharge pipe is changed to another location. Then the steam roller gets in its work, after which men scrub down the surface with heavy brooms. The pavement is then allowed to set and dry out for six to ten days. The engineer in charge of the work said that the pavement is guaranteed to last five years. The advantage claimed for the process employed is that by rolling the stone first and then filling in the concrete all crevices are filled and cracking of the surface is obviated.



Courtesy, William J. Johnson, photographer, and Hartford (Conn.) Daily Times.
LAYING CONCRETE PAVEMENT.

New Highway System for Upper Michigan.

Iron River, Mich.—The completion and connection of the highway systems in Gogebic and Iron counties will be accomplished early next summer, and it will be possible for automobiles to cover these two counties, visiting every important point in each, without leaving the improved roads of the system. Announcement to this effect has just been made by the road officials. An important feature is the fact that the roads will connect the Gogebic and the Menominee iron ranges with a fine macadamized highway. Iron county alone voted $50,000 for a small portion of the work. The entire upper peninsula is experiencing a boom in road building.

Begin Jacksonville-St. Augustine Brick Road.

St. Augustine, Fla.—The work of hauling brick along the Jacksonville-St. Augustine road preparatory to the beginning of paving work is well under way. The J. Y. Wilson Construction Company, contractors, has 5,000,000 brick ready in Jacksonville to be shipped as a starter. Gangs are already at work laying the brick. It is felt that the laying of 65 miles of brick highways will mark the beginning of a new era in the development of St. Johns. It is believed that before the work is completed the voters will get more than 65 miles of brick out of the $650,000 bond issue they voted. Of this total amount, $96,000 went to take up outstanding indebtedness already existing. The contractors promise that the road will be completed by January 15 of next year.

Novel Concrete Paving.

Schenectady, N. Y.—An innovation is to be tried by the city engineering department in the paving of Ostrander Place. This is to be paved with a 7-inch deep single course layer of concrete and will be the first real concrete street in the city. The stretch to be paved is about 450 feet long by 24 feet wide. The novel feature that has not been tried elsewhere, to the knowledge of the department, will be expansion joints alongside of the curb and every twenty feet running across the street diagonally at an angle of 60 degrees. That is, the pavement will be divided up into diamond-shaped blocks, each running the entire width of the street and along the curb for 20 feet, but separated from the curb and the adjoining blocks by a space varying from one-fourth inch at the curb to three-eighths inch between blocks, and filled with tar asphaltum or similar material. The reason for having these joints

run diagonally is to minimize the shock of the concussion of wagon wheels, as by this arrangement only one wheel would strike the joint at a time instead of both forward and back wheels together, as would be the case were the joints or cracks perpendicular to the curbs. The curbs will be of concrete also and will be 6 inches wide by 24 inches deep.

SEWERAGE AND SANITATION

New York Bans Roosters and Muzzles Dogs.

New York, N. Y.—New Yorkers will not be disturbed at dawn by the crowing of cocks after November 1 if the new regulations approved by the Sanitary Superintendents of the Department of Health are adopted. The proposed regulations will prohibit persons from raising chickens in their back yards where there is another residence or public institution within seventy-five feet of the poultry inclosure, and, furthermore, residents of the greater city will not be allowed to keep roosters. The chicken problem in this city already has engaged more than its share of the attention of the health authorities, according to Deputy Health Commissioner Emerson. He pointed out that 7,000 out of 21,000 inspection visits by the sanitary inspectors last year were made to find out if premises were suitable for keeping chickens. Dr. Emerson said that the presence of fowl, particularly in the tenement districts of Manhattan, had become a nuisance. The new regulation will require that all chickens be confined in coops, and that the coops and runways be thoroughly washed and renovated each year. During the last year 8,600 permits were issued to persons in the greater city to raise chickens. The number of chickens represented by these permits is something like 200,000.

Commissioner of Health Goldwater is fighting the numerous dog owners who have protested loudly against the recent muzzling order. He says that from January 1, 1900, to May 31, 1914, 121 persons in this city died from rabies and that if the Department of Health had done its duty fifteen years ago these deaths would not have occurred. Commissioner Goldwater pointed out that out of 6,000 dogs examined last year 268 were found to be rabid, and that 570 persons received Pasteur treatment for dog bites at the climics of the Department of Health. He asserted that the new ordinance was also in the interest of dogs, and that it had been carried out successfully in foreign and American cities.

Typhoid in Brooklyn.

Brooklyn, N. Y.—The causes of the outbreak of typhoid fever in the Park Slope section of Brooklyn are puzzling the Board of Health. Though bacteriologists have not finished analysis of the water taken from the taps in the neighborhood, the examination of the specimens has progressed considerably, and so far the water seems to be in good condition. A careful inquiry will also be made into the causes of all deaths which have taken place since September 1. The spread of the disease may have been checked, for there are no new cases reported from the Park Slope. Secretary Fiske of the Health Department and Dr. M. L. Ogan, chief of the Bureau of Infectious Diseases, say that there have been 53 cases of typhoid reported from the section. Considerable attention is being devoted to the possibility that an accumulation of sediment in "dead ends" of water mains on the Slope may have been responsible for the outbreak of typhoid. The Department of Water Supply has suggested such a possibility.

New Bedford's Typhoid.

New Bedford, Mass.—A total of 23 cases of typhoid fever, half of them in the south end of the city during the past eight days has stirred the board of health to action in an effort to locate the cause of the sudden outbreak. Investigation showed that a milk dealer who has a route in the south end had been taken ill with the disease, and that there were four out of 12 cases in the south end that occured in families served with his milk. The health board acted promptly and ordered that the man be removed to the hospital while the handling of the cows and of the milk has been given into the charge of a new set of men. It was found that two of the four cases of typhoid among the customers of this route had been taken ill with the disease before the milkman himself while the majority of the cases in the south section had no connection whatever with the milkman or his product. For this reason the health board is inclined to doubt the theory of contagion through the milk supply but have taken additional precautions to be on the safe side.

WATER SUPPLY

Water Rates in Indiana.

Indianapolis, Ind.—The annual report of the Indiana Public Service Commission, just published, makes interesting comparisons between the rates charged for utility service in Indiana's towns and cities. Many of the figures in the report come from a series of questions that the Public Service Commission sent out to utility companies throughout the state, shortly after it went into office. Hereafter annual reports, on blanks and forms prescribed by the commission, will be available from each utility in the state. A study of the water rates discloses that fifteen of the twenty-five Class A companies have a minimum charge. The highest monthly minimum charge is $1.35, at Indianapolis. The next highest is $1.25 at Muncie. The highest annual minimum charge is $25, at New Albany. The lowest minimum charge is $4, at Fort Wayne. The next lowest is $5, at Lafayette. The highest flat rate for five rooms is $6, at both Elwood and Hammond. The lowest is $2, at Mishawaka. The next lowest is $3.50, at both Evansville and Kokomo. For private bath, Peru, East Chicago, Michigan City, Fort Wayne and Mishawaka each charge $2, while Jeffersonville has the highest rate, $5, and Elwood the second highest, $4. Toilets range from $5 at Elwood, to $1.90, at New Albany. Yard hydrants vary from $2.50 at Evansville to $7 at Vincennes. The highest meter rate in this class is 40 cents, at Jeffersonville. The lowest is 6 cents, at Laporte and Michigan City. The next highest rate is 25 cents, at Elwood, Gary, Kokomo, Richmond and Vincennes. Hammond has 7 cents; Elkart, 12 cents. The schedule for fire hydrants is given for but seven cities. The lowest is $25, at Kokomo.

Will Sell Light Plant to Get Water.

Charlton, Iowa.—Charlton citizens have started a movement for the sale of the municipal lighting plant for the purpose of raising sufficient funds to provide the city with water. The city water supply is now inadequate, and there is no money with which to remedy the situation, the city having reached the limit of its indebtedness.

Water Waste Checked.

Trenton, N. J.—Daily waste of 788,000 gallons of water from the city's mains has been checked by making repairs to the pipes. It is estimated the saving to the city as a result of this checking will be approximately $17,000 annually in distributing charges. The leak was located by pitometer tests. An unmetered connection to a manufacturing plant was found to be responsible for a flow of 150,000 gallons of water daily for which the city received no revenue. These facts were brought out at a meeting of the city commission. The commission authorized pitometer tests in other sections of the city at a cost of $6,300.

$125,000 Water Main Extension.

Portland, Ore.—Commissioner Daly, of the Department of Public Utilities, has approved plans outlined by Chief Engineer Clarke, of the Water Bureau, for betterments in the water distribution service in Northeast Portland, which will cost in the neighborhood of $125,000. These improvements will consist mainly of the extension of the big 30-inch main from its present terminus north one-fourth mile and west 2½ miles, to the Vernon stand-pipe. These plans will necessitate the laying of the main for a considerable distance outside the city limits, where it will be necessary to secure private rights of way. Much of this land has been platted and it is said it will be an easy matter to secure the privilege from the owners. This main

will insure the entire Peninsular district, where there has been a shortage of water during the present hot weather, an abundance of water. It is planned to construct the main this fall and winter and have it in operation by next summer. It also is planned to extend a 16-inch main through the Irvington district to relieve shortage of water in that part of the city. In this section there are small mains incapable of carrying a supply to meet the heavy demands of garden sprinkling. The larger main will insure an abundance of water for all purposes. Reports received from Superintendent Kaiser, of the Water Bureau, this morning show that the plan of sprinkling lawns on alternate days has had the desired results and that the pressure on all mains materially has been increased.

Investigating New York Water Companies.

Brooklyn, N. Y.—The franchises under which the private water companies are operating in Brooklyn and Queens are being separately investigated by the Law Department of the city, under the direction of Assistant Corporation Council Hahlo. A similar investigation is being made for the Board of Estimate by Delos F. Wilcox, a recognized expert on the franchises of public utilities. The investigation of the franchises of the Queens companies are about completed and those of the Brooklyn companies will follow immediately. The Board of Estimate is anxious to be fully informed of the actual value of these private plants in case it is eventually determined to purchase them as part of the municipal water system. But the city, before it agrees to any purchase plan, will call upon each company to furnish proof that it actually possesses a franchise under which it is authorized to operate it. A company, that lacks a legal franchise, will not be entitled to the same compensation as a company which is operating under a franchise that meets all legal requirements. The Urban Water Supply Company of Queens was recently denied the right in the Supreme Court to extend its mains in Long Island City, on the ground that such extension was not authorized under the terms and conditions of its franchise.

Investigate Reservoir Leakage.

Lima, O.—Surveys and explorations to last two weeks or more have been begun by the force of City Engineer Bryson, to obtain information to be used as the basis of recommendations as to what shall be done with the city upper reservoir. The data was asked by Walter Sherman, Toledo, hydraulic engineer retained to advise the city. Test pits are to be dug in the bed of the reservoir to determine what is the cause of the leakage, and with a view of draining the reservoir for repairs, the route of a pipe line will be surveyed from the present dam at the water intake to the pipe line running to the city. Through this line water would be carried to the city while the reservoir is out of service. The flow of the stream is to be measured to determine to what extent it may be relied upon for a supply. All of the present banks are to be measured to determine to what extent they need to be reinforced to be safe, and the location of the proposed retaining wall, to divert the stream where it now is eating away the south bank, is to be located. A complete map of the distributing system in the city is required.

New Plant Completed.

Rahway, N. J.—According to reports made by Superintendent Kirstein at the meeting of the Board of Water Commissioners, the work on the improvements, including a new sedimentation plant, at the municipal waterworks, has been completed as far as the work can be carried at the present time. Before the improvements can be completed the board will be obliged to await the arrival of the big pump being made by the Wheeler Condenser & Engine Company, of Roosevelt. The installation of this apparatus, together with a 10-inch pipe, will about complete the $26,000 improvements at the water plant, which are expected to give the city a first-class water supply for many years. Engineer Gage reported 58,049,880 gallons of water pumped during the month, a daily average of 1,872,576, or a decrease from the same period last year of 314,497 gallons.

Water Company Must Extend Systems.

Jefferson City, Mo.—The state public service commission, in ruling on a complaint filed by the mayor and other citizens of Webb City against the water company there, held that the commission not only has power to regulate the rates of public utilities corporations, but also when public conditions necessitate it, to require them to extend their systems. The commission also ruled that when a water company installs meters on its own motion it must bear the expenses. The Webb City company, it is alleged, had refused to extend its service into a new addition. The commission directed it to do so and also within ten days to sever its connection with its old water supply point, the water of which was held to be impure. It was held that there was no proof that the company was using the contaminated water, but the connection should be severed nevertheless.

To Study Utah Water Sources.

Salt Lake City, Utah.—J. C. Hoyt of Washington, D. C., engineer in charge of surface water division of the United States geological survey, has arrived in Salt Lake to begin a general inspection and study of water sources and water sheds in Utah. He will make the inspection in conjunction with E. A. Porter, engineer in charge of the local office of the United States geological survey. Immediately after the inspection Mr. Porter will begin a study of the depth and volume of water in the Colorado River along the Grand Canyon. The investigation will be made in conjunction with the Colorado River control project, and will begin immediately below the point where the San Juan River empties into the Colorado in southern San Juan County. It is said that in making the survey of the Colorado, Mr. Porter will be assisted by a crew of river experts, since the investigation may be attended by many dangers. Mr. Porter is said to have been instructed to follow the course of the Colorado River throughout the Grand Canyon, which is considered a hazardous undertaking.

May Meter All Water.

Newburgh, N. Y.—In order to increase its revenue, the Board of Water Commissioners is preparing to make another attempt to meter the city and to charge each consumer for the amount of water used. Although no definite action has as yet been taken, every commissioner expressed himself as favoring the plan. The board also directed Superintendent Curtis Stanton to prepare a list of all places in Newburgh taking water through more than a ¾-inch pipe. It is probable the assessment on those who are using the larger pipes will be increased. Should it be decided to meter the city, the consumer probably will be asked to pay for the meter.

STREET LIGHTING AND POWER

Seek Light Monopoly.

Columbus, O.—The Youngstown and Sharon Street Railway Company has made formal protest to the state public utilities commission against the application of the Mahoning County Electric Light Company for permission to issue $1,000,000 in capital stock. The Youngstown and Sharon company is seeking to prevent the entry of the Mahoning county company into the electric lighting field at Youngstown on the ground that there is not enough business for two companies. State laws say that the public utilities commission has the right to determine whether any new public utility is a necessity to the public service before giving consent to its operation.

Fire Destroys Lighting Plant.

Redding, Cal.—A fire which destroyed the substation of the Northern California Powder Co., near the city's pumping plant, entailed the loss of nine transformers valued at $18,000. The city was without water or light for several days.

A New $2,500,000 Light Corporation.

Dover, Del.—A charter has been filed here at the State Department for the Central Ohio Gas and Electric Company, capital stock $2,500,000. The objects and purposes are to acquire oil and gas lands in the Ohio and Western Pennsylvania, to operate gas works, to generate and purify gas, to lay pipe for the extension of gas, etc., to erect, maintain and operate reservoirs, ducts, etc. The charter

was filed by New York parties who recently filed here the Cities Public Service Corporation with $60,000,000 capital stock.

FIRE AND POLICE

Want Civil Service Police and Firemen.

Harrisburg, Pa.—Cities of the third class in Pennsylvania will ask the next legislature to enact a law permitting the placing of police and fire departments under civil service rules. A bill has been outlined by M. J. Young, chief of police of Newcastle, and copies have been sent to captains of police in all third class cities for their approval. Suggestions will be offered and changes made, and as soon as the proposed bill has been completed a meeting of captains of police of third class cities will be held in Harrisburg, and arrangements will then be made to place the bill before the next legislature. A committee will be appointed to look after the legislation. The civil service board will include the superintendent of the Department of Public Affairs, who shall be president; the superintendent of the Department of Accounts and Finance, and the superintendent of the Department of Public Safety. No salary shall be paid to the members of this board. This board, as soon as organized, will adopt rules to cover the selection and appointment of all persons to be employed or appointed in either the police or fire departments. The examinations shall be as to physical fitness, habits, reputation, standing, experience and education, including a knowledge of any subjects determined by the examining board.

The board must control all examinations, but may designate such persons as they see fit to conduct such examinations. The board is also given power to appoint a chief examiner, who will be subject to removal at any time. His compensation, hours of service, etc., will be arranged by the board. In addition to the examinations, all applicants will have to pass a physical examination conducted by a city physician, and must come up to the same standard as required of applicants in the United States army and navy. Councils will have the power to pass an ordinance specifying the number of men for the police and fire departments, and to name a sub-list. Appointments can be made from the sub-list when vacancies occur after 90 days' service as a sub. When appointment is to be made, three applicants shall be recommended by the examining board for each position. Council shall select one man from the three. The two rejected applicants will be assigned to the sub-list and recommended in their turn when vacancies occur. Rules governing the two departments will be made by the Superintendent of Public Safety. These rules must be enforced at all times. Penalties for violations shall be fixed, and no employee of either the police or fire department shall be removed for political reasons.

New Criminal Records System for Dallas.

Dallas, Tex.—A fingerprint system of criminal records and a complete new Bertillon outfit have been added to the equipment of the Dallas police, the apparatus ordered several weeks ago having arrived. It will be installed in the new City Hall and will be in charge of Lieutenant of Detectives Charles C. Gunning. Installation of the new systems will bring the identification and criminal record facilities of the Dallas Police Department up to the standard of the largest cities in the country, it is said.

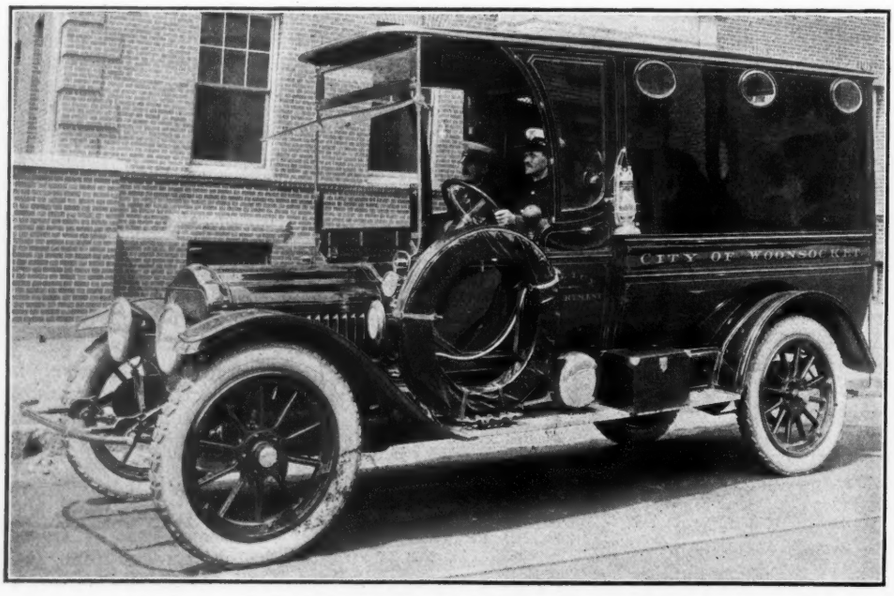
MOTOR VEHICLES

Hartford to Have New Tractor

Hartford, Conn.—A new two-wheeled tractor, the latest addition to the motor equipment of Hartford's Fire Department, will be delivered shortly and will be placed in service immediately with Engine Company No. 1. The tractor is being constructed by the American & British Manufacturing Company, of Providence, and represents all the latest improvements in fire department motorization. The contract was not let until after Chief John C. Moran had made a tour of the different cities of the east and completed a careful investigation of the merits of the apparatus turned out by several companies. The new tractor is of the gas-electric type, and will attain a speed of 30 miles an hour. Its weight will be slightly in excess of 8 tons. There will be a motor at each wheel. When Truck No. 3 is equipped with the tractor, the three largest trucks in the city will be motorized, and there will be only one truck still drawn by horses.

Woonsocket's New Ambulance-Patrol.

Woonsocket, R. I.—The new combination motor ambulance and patrol, the chassis of which was made by the White Company, of Cleveland, O., has been tested and found very satisfactory. The Police Commission and Chief Frederick E. Coe have accepted it and placed it in commission. The new machine is built on a special White chassis, with a wheelbase of 144½ inches. The motor has all the latest improvements and is of the 1915 model. It is of 40-horsepower rating and has 4 cylinders. The whole machine is painted Brewster green and has gold stripings. There are three small oval windows on each side at the top of the body panel. There are two cab windows from the top to the driver's seat. It is equipped with a folding stretcher, and the police will add a basket to carry sick or injured people. On the panels are painted the words, "City of Woonsocket." The driver's seat is painted "Police Department." The machine has pneumatic tires, 37 by 5 inches. This combination ambulance and patrol differs from the usual machine of this type in the fact that the sides of the body are concave, rather than convex. The body has three-ply roof and side panels, has foredoors and wooden frame for the wind shield, and inside it is finely sheathed, has a hardwood floor and is equipped with electric lights. Within there are seats and all the paraphernalia necessary for both ambulance and patrol purposes. The seats, when not in use, may be folded back out of the way.



NEW WHITE AMBULANCE-PATROL FOR WOONSOCKET.

It has the White electric lighting and self-starting equipment. The efficiency of the department should be greatly increased.

Auto Patrol Wagon Ordered.

Waukegan, Ill.—This city is soon to have an up-to-date auto patrol wagon. The chassis is now in course of construction at the Thomas B. Jeffery Company's plant at Kenosha, Wis. The body of the machine is being constructed at the McFarland shop in Chicago. It is estimated by Commissioner Clarence W. Diver that the machine will not be completed until the latter part of October. The officials of the Police Department are awaiting the arrival of the truck, as cases where it is needed are being presented daily.

New Fire Truck Arrives.

Sweetwater, Tex.—Local firemen are celebrating over the arrival of their new auto fire truck. The machine was manufactured by the American-La France Company, of Elmira, N. Y., and is said to be the most modern type. It is propelled by a 75-horsepower motor, equipped with an electric starter, and will throw 600 gallons of water per minute. The machine cost, complete, about $7,800.

Accept American-La France Truck.

Paducah, Ky.—The new automobile fire truck, purchased by the city from the American-La France Company, of Elmira, N. Y., has been formally accepted by the members of the purchasing committee of the general council. The machine fulfilled the requirements of Fire Chief John M. Slaughter. The cost of the machine is $8,000, while the old steam fire engine is accepted for a value of $1,000 in payment on the truck. The firemen are being trained in the handling of the machine, which will be placed in service soon.

New Motor Sprinkler for Newburgh.

Newburgh, N. Y.—The new motor sprinkler which the Street Cleaning Department recently received has been put into commission and is doing excellent work. The sprinkler is mounted on a five-ton Garford chassis, sold by the R. & L. Co., of New York, eastern distributers, through Sloane & Clapper, of Newburgh. The tank is made of galvanized steel and has a capacity of 1,200 gallons. The sprinkler is equipped with a pump capable of discharging 250 gallons per minute and maintaining 35 pounds pressure. The flushing equipment consists of a nozzle back of each wheel, each having a sprinkling head. The whole mechanism is operated from the driver's seat. The tank is painted green and the running gear red.

GOVERNMENT AND FINANCE

Boston's Expenses Still High.

Boston, Mass.—That City Hall economies are gaining slowly in reduction of expenses over the last year of the Fitzgerald administration is disclosed by the last monthly statement of City Auditor Mitchell. Seven months of the present administration have cost, for actual running expenses of the various departments, $226,187.30 more than the corresponding months of last year, greatest gains having been made in two of the largest departments—parks and recreation and the public works. While this showing is much higher than the mayor expected it would be when he took office, he declares that headway is being made despite the constantly increasing obstacles of high cost of supplies and greater demands of hospital, overseers of the poor and infirmary departments. For instance, the expenses of the overseers' departments have increased from $123,897 last year to $287,674 this year, the greater part of the increase being due to the widows' pension bill. The hospital department has gone from $379,882 to $402,368. There are three departments over which the mayor has no control in the matter of expenses—police, licensing and school. The increased expense of these departments to date over the corresponding period of a year ago is $263,562.86.

NEWBURGH'S NEW GARFORD SPRINKLER.

Commission Form Defeated.

Bay City, Mich.—The proposed charter providing for a commission form of government for Bay City was defeated at a special election by a majority of 255, 2,723 deciding in favor of the councilmanic form. Incensed at the opposition, which they claim was largely fostered by liquor interests, the champions of the lost charter are starting a campaign for local option.

Plans for Proposed State Municipal Bureau.

Watertown, N. Y.—Addressing a large audience consisting of city officials and prominent citizens, Mayor Rosslyn M. Cox of Middletown, president of the State Mayor's Conference, and William P. Capes of New York, secretary of the conference, found favorable sentiment existing in this city towards the State Bureau of Municipal Information. Mayor I. R. Breen presided and introduced the two speakers. Watertown was the second city visited on a tour that will embrace 20 other cities in the northern and western parts of the state. Ogdensburg, the first place visited, was also favorable. The bureau of information is to fill a long felt want, supplying as it will a vast amount of information which can now be obtained only after weeks of delay and much work on the part of the clerk of the city wishing the information. Aside from supplying information the bureau will seek to establish uniform municipal ordinances, a health survey, a uniform accounting system and a city planning survey. In outlining the plans for the proposed bureau Mr. Capes said that the present council has decided that the best plan is to seek the financial support of public spirited citizens in the state who are interested in securing for the cities the most efficient administration of public affairs that is possible. It is the belief of the committee that if the bureau can be operated for three years in this way, it will establish absolute proof as to the feasibility of the plan and the value of its service and that thereafter the cities of the state will be willing to take over the activity and finance it themselves. It will be the object of the council:

1. To gather information and statistics relative to municipal problems and improvements and to distribute them among the city officials of the state.
2. To keep all municipalities informed about bills introduced into the legislature and newly enacted laws affecting the cities.
3. To furnish to any city upon request all available information or statistics relative to any municipal activity indicated.
4. To keep municipal officials of the state in touch with each other by distributing among them any new plans devised by an official of any department. The bureau will also keep officials informed as to the progress of every municipal innovation thus reported so that they may know of the success or failure of such innovation.

5. To distribute such reports and other literature relative to municipal government and activities as will aid municipal officials.

Besides this general work the bureau will undertake to carry out this special program during the next three years:

1. A state wide municipal welfare campaign to get the people acquainted with what their respective cities have and have not. Such a campaign would serve to put public officials and their constituents on a co-operative basis and to make each appreciate the aims, needs and desires of the other; to quicken the interest of all citizens in municipal affairs; to bring to light unfilled municipal needs; and to prove the usefulness and economy of complete study of exact facts as a basis for intelligent and therefore practical action.
2. The codification of municipal laws and ordinances of every city in the state.
3. A newspaper publicity campaign through which the urban population of the state may be apprised of the best and latest thought regarding present day municipal problems.
4. Such an amendment to the state constitution as will give to the cities of the state absolute local self-government; also the enactment of an optional non-partisan municipal act and of laws that will improve the methods of urban tax assessments.
5. To complete the city planning survey of the cities of the state, which survey was started by the conference last year.
6. To make a health survey of the cities of the state.
7. To draft a standard code of general municipal ordinances, any one or all of which may be adopted by the cities. At the present time there is no uniformity of general municipal ordinances and many of those now in force are faulty, obsolete or unconstitutional.
8. To secure for the cities of the state a uniform accounting and reporting system.

The council has conservatively estimated that to establish and operate the bureau for three years, a fund of $25,000 will be necessary, and it does not intend to start the activity until the entire sum has been pledged. There are 52 cities in the state. Estimating the cost of the bureau for three years to be $25,000, the actual expense of the service rendered per city would be only $160 a year. Compared with the service it is proposed to render it is claimed that no public activity or private agency working for public welfare that is operating more economically and accomplishing more for efficiency in municipal work.

Commission Form Adopted.

Florence, Ala.—The election as to whether Florence would continue under the aldermanic form or be changed to the commisssion form, has been submitted to voters with a resulting majority of 87 in favor of the change.

Court Ousts City Officials.

Easton, Pa.—Judge Barber, of Carbon County, who presided at the proceedings instituted in the Northampton County Court to determine the validity of South Bethlehem's city charter, has filed an opinion setting aside the charter and ousting Mayor Mitchell Walter, the City Council and all the other city officials from office. Unless the higher courts should reverse the opinion, this means that South Bethlehem must return to the borough form of government. Judge Barber in his opinion declared the election null and void because it was decided by a majority of citizens at a special election instead of at a municipal election. The decree takes effect November 4, and it is believed Council has time to advertise for another election and thus save the city form of government.

Consider New Accounting System.

Springfield, Mass.—The new liability system of accounting for city departments is completed. The Bureau of Municipal Research has finished nine months of careful work on it, and the detailed report will be presented to the city government. All that now remains is to get the stamp of approval from Charles F. Gettemy, director of the State Bureau of Statistics. Dr. Cleveland, of the New York bureau, directed the working out of the system. The state statistician has already expressed unofficial approval of the system, after having learned some of the details of it here. The Springfield research bureau began developing the liability accounting system last winter when the defects in the present system were shown up at the time of the budget making. The liability system, if adopted, will mean the unification of the books of every city department, thus relieving the auditor's office of much unnecessary labor. It is expected to put the city's financial affairs in a far more satisfactory condition so that the making of the annual budget will be accurate.

Propose City-County Combination.

Los Angeles, Cal.—The voters of Los Angeles will have the opportunity at the next general election to express themselves on the proposition of combining the offices of the City Assessor and the City Tax Collector with the similar county offices so that the county officials will do the work of this kind now done by the city officials, at a saving to the taxpayers of more than $76,000 per year. The Board of Supervisors will make a formal offer to have the county officials do the city's work on this line for one-sixth of 1 per cent of the collections. On a basis of a tax roll reaching $6,000,000, this would amount to approximately $10,000; but the Supervisors believe that it is possible the work can be done for less, and, if so, they propose that the county shall refund to the city the difference. The present city budget provides $49,289 for making the city assessment, and $41,840 for the collection of the taxes, making a total of $91,129. Aside from the $10,000 which the city would have to pay the county, there would be necessary an outlay of $5,000 for the city's collection of license fees, etc. Thus a total of $15,000 would accomplish the work that is this year to cost $91,129. Members of the Council believe that this proposition will not work against the large proposition of city-county consolidation, the way for which will be provided through the proposed constitutional amendment.

STREET CLEANING AND REFUSE DISPOSAL

Dayton Increases Efficiency of Garbage Collection.

Dayton, Ohio.—Garbage collection in Dayton for the remainder of the year will be stimulated by the transfer to the garbage collection fund of $2,000 which has been authorized by City Manager Waite. More men and wagons will be put on duty and garbage will be collected in all parts of the city more regularly than has been done heretofore. There have been complaints filed at the office of the service department during the summer by people who object to carrying their garbage to the alleys or on the sidewalks in order that the garbage men would collect it. Manager Waite reported that this could be done away with in Dayton as the additional fund would provide more men who would go into the yards and collect the garbage, provided it was confined in proper receptacles. Following the cut in city running expenses during the remainder of the year it was found that sufficient money would be on hand to facilitate this branch of the public service and it was accordingly transferred for immediate use.

Reading, Pa., Garbage Plant Successful.

Reading, Pa.—The garbage incinerating plant at Reading is working splendidly. The building contains two burners with a combined capacity of 50 tons a day, and the garbage collections at present are on an average equivalent to the plant's capacity. Burning very little coal, the two ovens destroy every particle of animal and vegetable matter in the garbage. It leaves only coal ashes, iron and tin from cans burned with the rubbish. Keller & Price, of Lancaster, who built the plant, are personally supervising it for a month's operations. Eventually the city will install a furnace or cupola to melt the iron, tin and lead in the cans. Plans are being considered by the city for the use of the heat at the garbage incinerators. An electric dynamo of large capacity may be put into the plant. There would be current enough for a variety of purposes. The building could be lighted by electricity and the house sewage pumping station in this city could be operated by current generated at the garbage disposal plant. The city pays $900 to $1,100 a month for electricity for the pumping of sewage. The city might make enough current, using steam that could be generated in boilers at the garbage kilns, to run these pumps. No action has been taken to make use of the heat, as the city will not accept the garbage plant until the month's test is ended. If satisfactory, the city will run the burner itself and will then make plans to make use of a source of power now wasted.

LEGAL NEWS

A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

Private Nuisance—Cesspool and Gasoline Tank.

De Moll v. City of New York.—Defendant city maintained on its own property a private alleyway with a cesspoor or drain to carry off water that would accumulate because of the conformation of the surface. The drain at intervals became clogged, causing water to collect in the alley. Defendant also maintained, on its own property below the surface, a tank for storing gasoline, from which certain gasoline had escaped and spread over the surface of the accumulated water, and this became ignited while plaintiff, a fireman, was in the alley, resulting in an explosion and injury to him. Held, that the co-existing combination of both tank and drain, neither of which constituted a nuisance in itself, was not a private nuisance.—Supreme Court, Appellate Division, 148 N. Y. S. 667.

Police Force—Neglect of Duty.

People ex rel. Smith v. McKay, Police Commissioner.—Relator, a patrolman and detective, was given a bench warrant in December, 1912, for the arrest of K. It was then believed that K. resided at a certain street number; but he was not found there, and he was not found on April 15, 1913, when relator's superior informed him that K. could be found at 23 Avenue B. Relator went to such address many times, and interviewed the tenants and janitress without success. He reported frequently to his lieutenant, but failed to interview the landlord of the premises. He communicated with K.'s bondsmen, and finally, in the middle of June, found K. at the address given; his failure to find him before being due to the fact that K. had changed his name and was known there and in the neighborhood by his alias. Held, that relator's failure to interview the landlord and to more promptly arrest K. was not such neglect of duty as justified his dismissal from the force.—Supreme Court, Appellate Division, 148 N. Y. S. 692.

Powers of Town Owning Electric Plant.

Town of Akron v. McEllegott.—A town owning an electric light plant may make all reasonable rules as to the method of doing the work of wiring, and provide for inspection prior to connection with its system, and require conformity to standards reasonably necessary to safety and efficiency.—Supreme Court of Iowa, 147 N. W. R. 773.

Street Improvements—Acceptance.

Transfer Realty Co. et al. v. City of Superior et al.—Where the board of public works of a city refused to approve a street improvement work, because not in compliance with the contract, and then directed the city engineer to determine what deductions from the contract price should be made for noncompliance, and the city engineer reported that a deduction of a specified sum would cover the difference between the improvement as constructed and its value if in strict compliance with the contract, and thereafter the board accepted the improvement on the contractor's filing an acceptance of a settlement calling for a reduction of the specified amount from the contract price, and certificates were subsequently issued by the board, the board accepted and approved the work and adjusted the claim of the contractor.—Supreme Court of Wisconsin, 147 A. W. R. 1051.

Death—Excessive Damage.

Bektner v. Town of Summit.—A verdict of $5,000 for the death of a strong, able-bodied man 49 years of age, weighing 180 pounds, who was a steady worker and could always earn good wages and was the sole support of the surviving wife, but left no children, and who was not shown to have accumulated any property, was excessive and would not be allowed to stand unless plaintiff should elect to take a verdict of $3,000.—Supreme Court of Wisconsin, 147 N. W. R. 1072.

Establishment of Highway—Location.

Town of Howard v. Burnette.—The rule that, where a highway opened and used as such does not exactly coincide with the lines of the road laid out, the public acquires a right to use the particular strip and abandons those portions of the way laid out not included within such strip, had no application where the dispute in an action to enjoin an encroachment was as to the location of the highway as opened and used.—Supreme Court of Wisconsin, 147 N. W. R. 995.

Grade Crossings—Negligence of Railroad Co.

Hagnan v. City of New York et al.—A railroad company, obtaining a permit to change a grade crossing, must, when finishing the work, leave the street in as safe a condition as it found it, and must provide for the effects of the resumed and ordinary use of the street by the public, and of rain or snow and the changes of weather.—Supreme Court, Appellate Division, 148 N. Y. S. 63.

Obstruction of Streets—Municipal Liability.

City of Florence v. Woodruff.—A bill charging that defendant city issued to a certain person a license as a public weigher, which authorized him to maintain scales, knowing that he was then operating them at a particular place so as to obstruct the street, without charging that it licensed him to maintain any scales at that particular place or any express authority to maintain the scales there, was insufficient to charge the city with liability.—Supreme Court of Alabama, 65 S. R. 326.

Paving Between Tracks.

Orange Co. Traction Co. v. City of Newburgh et. al—Where the franchise of a street railroad company provided for the erection of a single line of center trolley poles, and under such system the cars could not be conveniently and safely operated with less than 7 feet 10 inches between the tracks, the company, being bound to pave between the tracks and having so constructed its line, was required to pay the cost of paving the whole space, though it was greater than would have been necessary had the system been otherwise constructed.—Supreme Court, Orange Co., 149 N. Y. S. 1.

Sewer Assessments—Objections.

McKenzie v. City of Mandan.—Objections to an assessment which seek to correct errors in judgment and mistakes as to the real amount of the property is benefited must be urged before the commissioners and the city council, and, if not so urged, cannot afterwards be relied upon in a subsequent suit in equity to restrain the collection of such assessment. This is not true, however, of objections which involve the legality of the proceedings and raise the question that the method pursued was contrary to that provided by the statute.—Supreme Court of North Dakota, 147 N. W. R. 808.

Increase of Indebtedness—Election Notice.

McGuire v. City of Philadelphia.—Where a notice of an election to submit the question of a proposed increase of municipal indebtedness stated "the amount of the existing debt" of the municipality to be a certain amount, which was ascertained by deducting from the city's gross indebtedness a sum assumed by a school district coincident with the city, its publication was ineffective to authorize the holding of a valid election.—Supreme Court of Penn., 91 A. R., 628.

Judicial Powers—Supreme Court.

Northern Pacific Ry. Co. v. Richland Co.—A supreme court can announce no public policy of its own but merely what it believes to be the public policy of the people of the commonwealth by which it is created. It has no power to create or command but merely to construe, and where the people have spoken, either in the form of a constitutional enactment or a valid and constitutional statute, it must be controlled by their decisions and conclusions.—Supreme Court of N. D., 148 N. W. R. 545.

NEWS OF THE SOCIETIES

Calendar of Meetings.

Sept. 21-25.
ILLUMINATING ENGINEERING SOCIETY.—Eighth Annual Convention, Cleveland, Ohio. Assistant Secretary, Joseph Langan, 29 West 39th street, New York City.

Sept. 28-Oct. 3.
LEAGUE OF AMERICAN MUNICIPALITIES. Annual Convention, Milwaukee, Wis.

Oct. 6-9.
AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.—Annual Convention, Boston, Mass. Secretary, Charles Carroll Brown, Indianapolis, Ind.

Oct. 7, 8, 9.
LEAGUE OF KANSAS MUNICIPALITIES.—Lawrence, Kan. Secretary, C. H. Talbot.

Oct. 7-9.
MOTOR TRUCK CLUB OF AMERICA.—Annual Convention, Detroit, Mich. President, George H. Duck, New York.

Oct. 8-10.
GULF AND INTEROCEAN NATIONAL HIGHWAY ASSOCIATION.—Conference, New Orleans, La. Secretary, John B. Kent, Lake Charles, La.

Oct. 12 to 16.
AMERICAN ELECTRIC RAILWAY ASSOCIATION.—Convention, Atlantic City, N. J. H C. Clark, 29 West 39th street, New York City.

Oct. 14, 15.
ILLINOIS MUNICIPAL LEAGUE.—Annual Convention, Urbana-Champaign.

Oct. 20-23.
INTERNATIONAL ASSOCIATION OF FIRE ENGINEERS.—Annual Convention, Grunewald Hotel, New Orleans, La. Secretary, Mr. McFall, Roanoke, Va.

Oct. 21-23.
ALABAMA GOOD ROADS ASSOCIATION.—Nineteenth Annual Convention, Montgomery, Ala. Secretary, J. A. Rountree, 1021 Brown Marx Bldg., Birmingham, Ala.

Oct. 28-31.
NORTHWESTERN ROAD CONGRESS.—Annual Convention, Milwaukee, Wis. Secretary, J. P. Keenan, Milwaukee.

Nov. 9-13.
FOURTH AMERICAN ROAD CONGRESS.—American Highway Assoc. and American Automobile Assoc., Atlanta, Ga. Secretary, J. S. Pennybacker, Colorado Building, Washington, D. C.

Nov. 17-21.
NATIONAL MUNICIPAL LEAGUE.—Annual Convention, Baltimore, Md. Secretary, Clinton Rogers Woodruff, North American Building, Philadelphia, Pa.

Nov. 18-20.
WASHINGTON STATE GOOD ROADS ASSOCIATION.—Spokane, Wash. Secretary, M. D. Lechey, Alaska Building, Seattle, Wash.

Nov. 30-Dec. 6.
AMERICAN PUBLIC HEALTH ASSOCIATION.—Forty-second Annual Convention, Jacksonville, Fla. Dr. C. E. Terry, Chm., Executive Committee.

Dec. 2, 3, 4.
CITY MANAGERS' CONVENTION.—Springfield, Ohio. C. E. Ashburner, City Mgr., Springfield.

Dec. 14-17.
AMERICAN ROAD BUILDERS' ASSOCIATION.—11th Annual Convention; 5th Annual Good Roads Congress, and 6th Annual Exhibition of Machinery and Materials, International Amphitheatre, Chicago, Ill. Secretary, E. L. Powers, 150 Nassau st., New York, N. Y.

Feb. 10-17, 1915.
EIGHTH CHICAGO CEMENT SHOW.—Coliseum, Chicago, Ill. Cement Products Exhibition Co., J. P. Beck, General Manager, 208 S. La Salle Street, Chicago, Ill.

AMERICAN SOCIETY OF MUNICIPAL IMPROVEMENTS.

The program for the Twenty-first Annual Convention to be held at the Hotel Somerset, Boston, Massachusetts, October 6-9, 1914, follows:

Monday, October 5, 1914.

The Committee on Standard Specifications will meet with the various subcommittees: Wood Block at 11 a. m.; Brick Paving at 11.30; Bituminous Paving at 12; Asphalt Paving at 12.30; Concrete Pavements at 2; Stone Block Paving at 2.30; Broken Stone and Gravel Roads at 3 p. m., and Sewers at 3.30.

Registration of members, delegates and visitors will begin at the same time.

Tuesday, October 6.

9. a. m. Registration, payment of dues, issue of credentials and information.

9 a. m. Meeting of Executive Committee.

10 a. m. Addresses of welcome and responses, to be provided by the local committee.

11 a. m. Business session as provided by the Constitution.

1. The President's address.
2. Reports of the Secretary and Treasurer.
3. Report of the Executive Committee.
4. Report of the Finance Committee.
5. Reports of Special Committees.
   Obituary Committee.
   Committee on Membership.
   Committee on Sidewalks.
6. Selection of Nominating Committee.

Tuesday, October 6, 2 P. M.

Reading and Discussion of Papers.

Report of Committee on Garbage Disposal and Street Cleaning, Robert Hoffman, chairman, Columbus, O.

Papers by I. S. Osborn, in charge of garbage reduction plant, Toronto, Ont.; and S. A. Greeley, Winnetka, Ill.

Paper on "Street Cleaning," by Edward D. Very, sanitary engineer, 17 Battery Place, New York City.

Paper on "The High Temperature Incinerating Plant at Savannah, Ga.," by E. R. Conant, chief engineer of Savannah, Ga.

Report of Committee on Street Lighting, J. E. Putnam, chairman, assistant city engineer, Rochester, N. Y.

Paper on "Municipal Ownership and Operation of Electric Utilities on the Pacific Coast," by C. Wellington Koiner, engineer and superintendent of municipal electric light and power plant, Pasadena, Cal.

Tuesday, October 6, 8 P. M.

Report of Committee on Sewerage and Sanitation, A. J. Taylor, chairman, engineer in charge of sewers, Wilmington, Del.

Paper on "Sewage Disposal, Preliminary Investigations Required," by E. A. Fisher, consulting engineer of Rochester, N. Y.

Paper on "Converting an Old Septic Tank Into a Modern Two-Story Tank," by Alexander Potter, consulting engineer, New York City.

Papers by T. Chalkley Hatton, Milwaukee, Wis., and E. L. Dalton, Dallas, Tex.

Papers on "Economics of Sewage Filters," by George W. Fuller, consulting engineer, New York City.

Paper on "The Experimental Sewage Disposal Plant of Brooklyn, N. Y.," by George T. Hammond, engineer in charge.

Paper on "The Disposal of Inflammable Wastes Into Sewerage Systems and the Problem of Prevention," by Norman S. Sprague, Superintendent Bureau of Construction, Pittsburg, Pa.

Paper on "Permanent Sediment Records for Water and Sewage," by George C. Whipple, consulting engineer, New York City; Professor of Sanitary Engineering in Harvard University and the Mass. Inst. of Tech.

Wednesday, October 7, 9 A. M.

Report of Committee on Fire Prevention, Alcide Chausse, chairman, city architect and superintendent of buildings, Montreal, Que.

Paper on "Fire Prevention," by J. C. McCabe, boiler inspector of Detroit, Mich.

Paper by Franklin H. Wentworth, secretary of the National Fire Protection Association.

Report of Committee on Water Works and Water Supply, George W. Fuller, chairman, consulting engineer, 170 Broadway, New York City.

Paper on "Limitations of Water Filters," by George W. Fuller.

Wednesday, October 7—Afternoon.

By courtesy of the City of Boston the convention will take a boat ride on the city steamer Monitor about Boston Harbor, visiting improvements not otherwise easily reached, starting at 1.30 P. M.

Wednesday, October 7, 8 P. M.

Query Session.
Election of Officers.
Selection of Place of Meeting.

Members are invited to bring to this session any large or small subject which they would like to have discussed. If questions are sent in advance to the Secretary he will endeavor to have some one of experience in its line to open the discussion. At this session will be presented the results of the inquiries made by the Clearing House of Information. The subjects covered by these inquiries are the following:

Economical Maximum grades of pavements.
Maximum suitable traffic for each paving material.
Explosions in Sewers.
Creosoted Block Pavement.
Bricks laid flat.
Garbage incinerators.

Thursday, October 8, 9 A. M.

Report of Committee on Standard Specifications, George W. Tillson, chairman, consulting engineer of the Boro of Brooklyn, N. Y.

The following chairmen of sub-committees will present reports to the general committee on Monday, October 5, and following days, which will be presented by the general committee as agreed upon at this point in the program of the convention: Ellis R. Dutton, wood-block paving; E. H. Christ, brick paving; Francis P. Smith, asphalt paving; C. E. P. Babcock, concrete paving; A. H. Blanchard, broken stone and gravel roads; E. J. Fort, sewers; H. H. Schmidt, stone block paving,

and Linn White, bituminous paving.

Report of the Committee on Standard Forms, J. C. Hallock, chairman, deputy chief engineer, Newark, N. J.

Sub-committees: Street Paving and Repairs, J. H. Sullivan, division engineer, Public Works Department, Boston, Mass.; Street Cleaning and Repair Disposal, J. T. Fetherston, commissioner of street cleaning, New York City; Street Lighting, G. A. Sawin, electrical engineer, Public Service Electric Co., Newark, N. J.; Sidewalks and Curbs, Harry F. Harris, engineer of streets, Trenton, N. J.; Sewer Construction and Maintenance, E. S. Rankin, engineer of sewers and drainage, Newark, N. J., and Uniform Bidding Blanks, L. E. Stevens, city engineer, Grand Rapids, Mich.

Thursday, October 8, 8 P. M.

An automobile ride by courtesy of the local committee, inspecting public works and historical points in Boston and vicinity.

Thursday, October 8, 8 P. M.

Reports of Committee on Street Paving, W. J. Hardee, chairman, city engineer, New Orleans, La.

Paper on "The Bleeding and Swelling of Longleaf Pine Paving Blocks," by C. H. Teesdale, in charge of Wood Preservation, Forest Products Laboratory, Madison, Wis.

Paper on "The Effect of Leaking Illuminating Gas on Bituminous Pavements," by George C. Warren, Boston, Mass.

Paper on "Concrete Highways," by George W. Myers, road engineer, Association of American Portland Cement Manufacturers, Columbus, O.

Paper on "Napped, Reclipped, Grouted, Granite Block Pavements, the Ideal Economical Pavement for Heavy Traffic Streets," by William A. Howell, engineer of streets and highways, Newark, N. J.

Friday, October 9, 9 A. M.

Report of Committee on Municipal Legislation and Finance, Nelson P. Lewis, chairman, chief engineer of Board of Estimate and Apportionment, New York City.

Paper on "Recent Tendencies in City Charters," by Nelson P. Lewis, New York City.

Paper on "The City Efficient," by Louis L. Tribus, consulting engineer, 86 Warren street, New York City.

Paper on "Hints Leading to Good budget Making for Municipalities," by William Thum, Pasadena, Cal.

Paper on "Municipal Financing" with forms for reports used in the departments of the city of Hamilton, Ont., by A. F. McCallum, city engineer.

Report of Committee on Traffic on Streets, Louis L. Tribus, chairman, consulting engineer, New York City.

Report of Committee on Park Development and Maintenance, George A. Parker, chairman, superintendent of parks, Hartford, Conn.

Paper on "Small Parks," by Clarence D. Pollock, consulting engineer, Park Row Building, New York City.

Note on "Cleaning and Maintenance of Pavements Without Sprinkling," by Walter F. Slade, Commissioner of Public Works, Providence, R. I.

On Friday afternoon and Saturday those who wish to remain to inspect work in the city in progress or completed will be aided in arranging their time to the best advantage. Boston has many remarkable municipal improvements to its credit as well as many historic monuments and places which will well repay the time spent in visiting them and the local committee will aid in any way possible to make the stay of delegates enjoyable and profitable. Many delegates bring with them members of their families.

The preceding program is more than usually full for this time in advance of the convention and the list of advance papers in the accompanying pamphlet is larger than ever before. These are sent that the members may have an opportunity to prepare themselves to discuss them fully at the meeting, adding such data from their own experience as will give them their full value. Members are earnestly recommended to make some preparation for these discussions and the papers themselves will be read in abstract at the sessions so as to give as much time as possible for the discussions.

Committee reports and papers not given in full were not received in time to print with the advance papers. The reports of the sub-committees of the Committee on Standard Specifications are not generally in shape for printing in advance of the meeting of that committee on Monday preceding the convention proper. All members and others interested in these specifications are urged to be present at the committee meetings, as they are usually informal and attended only by those interested and the discussions are therefore more free and detailed and the results are more readily reached than in a general discussion in a convention session. The reports are, however, open for discussion in convention after they have been presented.

MOTOR TRUCK CONVENTION.

The topics for discussion at Detroit on Oct. 7, 8, 9, 10 and 11, 1914, have been announced as follows:

Wednesday, Oct. 7, 2:30 to 5:30 P. M.

"Time Payment Plan for Selling Trucks."

"Territorial Lines for Dealers."

"Evils of Overloading and Overrating."

"Advertising—Relationship Between Factory and Dealer."

Wednesday Evening, 8 P. M.

Dutch Lunch Cabaret. (Guests of Detroit Committee.)

Thursday, Oct. 8, 9:30 to 12:30 A. M.

"List Prices, Discount for Quantity Business, Discounts On Parts, Amount of Parts to be Carried."

"Traffic and Transportation Engineering."

"Use of Motor Trucks on Farms."

"Deposits on Sales—Advertising Campaigns in Relation to Distributors' Territory."

Thursday, 2:30 to 5:30 P. M.

"Importance of Dealers Selling at List Prices."

"Factory Sales Assistance to Dealers."

"Tire Guarantee and Mileage."

Thursday, 8 P. M.

Theatre party at Temple Theatre. (Guests of Detroit Committee.)

Friday, Oct. 9, 9:30 to 12:30.

"Manufacturers' Guarantee and Service to Owners." What Is Service? Free Service. Replacement of Parts. Inspection. Garaging. Educating Drivers. Assisting Owners. Stocks and Parts. Furnishing Spare Trucks When Repairing Others. Price on Labor for Replacement of Parts Under Factory Guarantee.

"Central Market Reports on Trucks."

"The Trading Evil."

"Demonstrations — Necessity and Charges."

Friday Afternoon, 2:30 to 5:30 P. M.

"Prices for Labor in Different Cities."

"Drivers' Relation to Successful Motor Truck Operation."

"How to Calculate Maintenance Cost."

"Loading and Unloading Devices that Save Time."

"Contract Delivery Work."

Friday Evening, 7 P. M.

Banquet ($2.50 per plate).

Saturday, Oct. 10—Closing Session—9:30 to 12 P. M.

Completion of Unfinished Topics.

Consideration of Annual Shows, Future Conventions, Permanent Organization, etc.

Other Subjects for Discussion:

"Requirements of Vehicles for War Purposes."

"Explanation of English, French and German Subsidy Systems."

"Effects of Selling Trucks Due to Exaggerated Claims for Economy as Compared with Horse Cost."

"Traffic Conditions Which Are Working Injury to Truck Sales."

"Evils of Knocking."

"Truck Sales and How to Close Them."

"Figures on Cost of Operation in Different Cities."

"Discussion of Body Construction by Prominent Body Manufacturers."

League of Iowa Municipalities.

At Burlington, municipal officials of Iowa gathered for the seventeenth annual convention of the association on Sept. 8, 9 and 10.

Mayor W. C. Cross of Burlington welcomed the delegates and his welcome was responded to by President J. F. Ford, mayor of Fort Dodge.

A list of the papers read follows:

"Municipal Home Rule for Iowa," by Hon. A. C. Mueller, mayor, Davenport. "Municipal Franchises," by Hon. J. R. Hanna, mayor, Des Moines. "Pavements," by Hon. John MacVicar, Des Moines. "Value of Pure Water," by R. E. McDonnell of Burns and Mc-

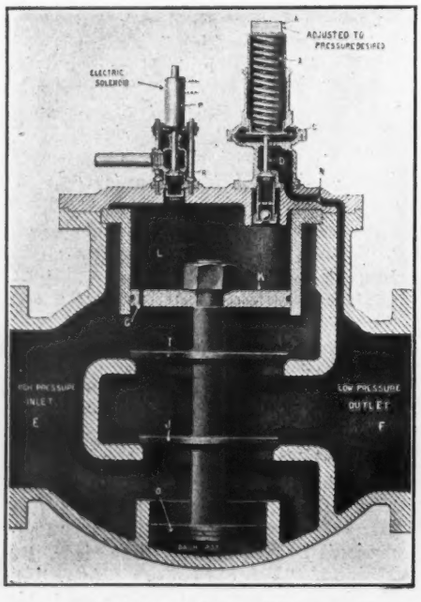
(Continued on page 438.)

NEW APPLIANCES

WATER-CONTROLLING VALVES.

Altitude Regulating Valves.

Golden-Anderson Patent Cushioned Controlling Altitude Valves are made in a number of designs for automatically maintaining uniform stage of water to turn back through the valve the use of floats or fixtures. The valves have no metal-to-metal seats and are made of heavy iron bronze-mounted. They may be closed either automatically by water, by electricity or by hand. In the illustration of this valve, piston "B" is practically a float held in suspension. The column of water above the diaphragm does not cause any resistance in the operation through the main valve except when the height of water reaches the point to which the valve is adjusted. The valve automatically maintains a level independently of the other attachments and may be arranged to allow the water to turn back through the valve for distribution whenever the pressure is less on the inlet side. In the sectional view, the main valve is closed. When water is drawn in the pressure is removed from the top of diaphragm "B," raising the spindle "K," allowing the auxiliary valve "H" to close and the exhaust valve "I" to open. The water above the piston escapes. The pressure being removed, "B" is forced open, the water above acting as a cushion in opening while the air drawn in at "F" acts as a cushion while closing. The water in the tank having reached the predetermined height, the pressure coming through "T" distributes the pressure on top of "R," causing "K" to close the valve "I" and open "H," allowing the pressure to be exerted on top of "B." The top being of greater area, the valve is forced to its seat, shutting off the water. Valve and connections are shown in the illustrations. The valve is for all sizes, from 3 to 24 inches, and for high or low pressure.

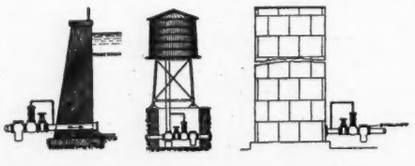


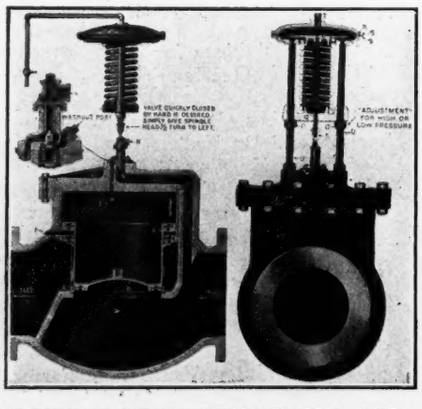
PRESSURE-REGULATING VALVE.

Pressure Regulating Valves.

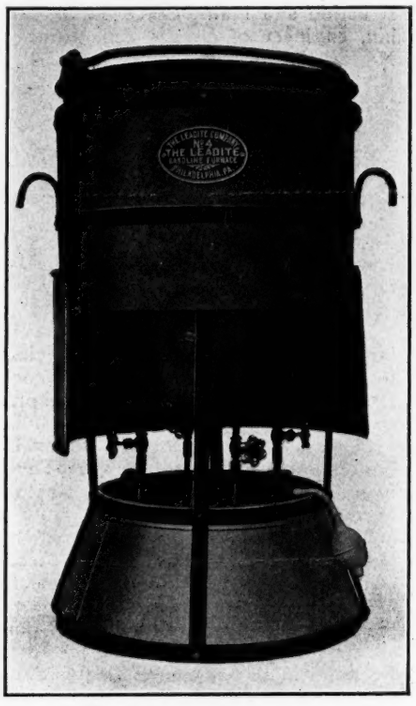
Golden-Anderson Patent Cushion Water Pressure Regulating Valves are for automatically maintaining a reduced water pressure in mains or for reducing a high to a low pressure for distribution. These valves may be fitted for quick electrical operation in case of fire. The valve is shown closed. The spring "B" is adjusted by the bronze sleeve "A" to the desired pressure. This spring acts on diaphragm "C," moving auxiliary valve "D" and unseating it. The pressure or inlet side is at "E" and the low pressure or outlet at "F." The water on the high pressure side fills the inlet chamber pressing on upper valve "I," and lower valve "J" and piston "K." The pressure, also passing through "G" into chamber "L," while "B" holds "D" open, the water passes on to port "N" to the pressure at which "B" is set. The pressure still increasing, exerts a pressure under diaphragm "C," which moves up, compressing spring "B" and allowing "D" to close. The main valves "I" and "J" are forced to their seats by the initial pressure shutting off the water. The piston "O" and "K" prevent chattering and acts as a cushion. The electric solenoid which controls the auxiliary valve is wired up to the switchboard at the pumping station or fire department, and in case of fire the switch is thrown, causing the solenoid to open the small auxiliary valve and exhaust the water pressure from above "K," which allows the main valve to open instantly to full area. These valves are made in many designs and sizes.

Both the pressure and altitude valves are made, among many other types, by the Golden-Anderson Specialty Co., Fulton Building, Pittsburgh, Pa.





ALTITUDE-REGULATING VALVE AND METHODS OF SETTING.



GASOLINE "LEADITE" FURNACE.

LEADITE GASOLINE FURNACE.

For Melting Leadite and Lead.

The wide use of leadite for pipe jointing has made it desirable to manufacture a furnace especially designed for melting the material. The Leadite Gasoline Furnace is a safe, non-explosive heater in which the heat can be regulated at will. The tank or reservoir is protected from the heat by a shield, which allows the air to circulate freely over it so that it is kept perfectly cool. The tank is made of twenty-four-ounce copper and is thoroughly tested. The whole apparatus is light and compact, and may be easily moved along the job. It is claimed to save the labor and fuel wasted in the coal, coke or wood furnace. It is in operation only when necessary. Although specially adapted for leadite, the furnace is excellent for melting lead. It is 30 inches high and 18 inches in diameter. It is equipped with four burners. The capacity of the reservoir is four gallons and the melting pot will hold 50 pounds of leadite or 325 pounds of lead.

This furnace, which is illustrated here is made by the makers of leadite, the Leadite Co., Inc., Land Title Building, Philadelphia, Pa.

GRIP PIPE FITTINGS.

The threading of pipe in connecting is a source of much time, labor and money expenditure and these losses may be eliminated by the use of the grip principle in connecting. Grip fittings, consist essentially, as shown in the cross section of a coupling, of a lead wedge-shape packing over which moves another gland wedging in the opposite direction. The second wedge is pushed forward so as to grip the other when a screw top is screwed towards the joint. The two ends of the pipe are thus gripped and encased by a single coupling and threading of the pipe itself is eliminated. This principle is used in all types of fittings and all sizes including a long sleeve connection to span a 4½ inch opening, a simple coupling, an ell fitting in which the inside surface is flush and without pockets, and a slip tee. In using grip couplings the pipe ends project past the shoulder for the lead seat ⅛ inch or more and then the nut is screwed up until the joint is tight in the body. These fittings are made of malleable iron and are claimed to stand any pressure up to 2,000 pounds. They are claimed to save two-thirds in time and labor. These fittings are made by the Ware Coupling and Nipple Co., Ware, Mass.

GRIP PIPE FITTINGS AND SECTIONAL VIEW.

PROTECTING PAINT FOR STANDPIPES AND TANKS.

Waterworks equipment, such as standpipes, tanks, pipes, stacks and all outdoor metal construction must be protected from corrosion, abrasion, heat, cold, weather and other deteriorating agents. Tank builders recommend that tank and trestles be gone over every two or three years and the inside be painted over every four or five years. Silica and graphite are claimed to make good paint material for such purposes because of their tenacity and damp-resisting qualities. Dixon's Silica-Graphite paint is made of these ingredients, using pure boiled linseed oil as a vehicle. This paint is claimed to afford protection for many years and when used on the interior of tanks does not taint or discolor the water. It is applied to a steel-brushed surface. It is made in four colors. It has been used successfully for many years by waterworks all over the country. Some examples of its use are illustrated here. The water tower at Leavenworth, Kan., owned by the Tumwater Power Development, Great Western Railway, is 190 feet high and has a capacity of 400,000 gallons. The standpipe at Marion, O., owned by the Marion Water Co., is 95 feet high and 25 feet in diameter; it was painted with the silica-graphite paint in 1902 and 1907, and on recent inspection was found to be in such good condition that repainting will not be needed for years. The standpipe at Lancaster, Pa., 115 feet high, was painted in 1903 and has withstood the years of hard and soft water, ice, heat, rain, gases, smoke and brine.

Dixon's Silica-Graphite paint is made by the Joseph Dixon Crucible Co., Jersey City, N. J.

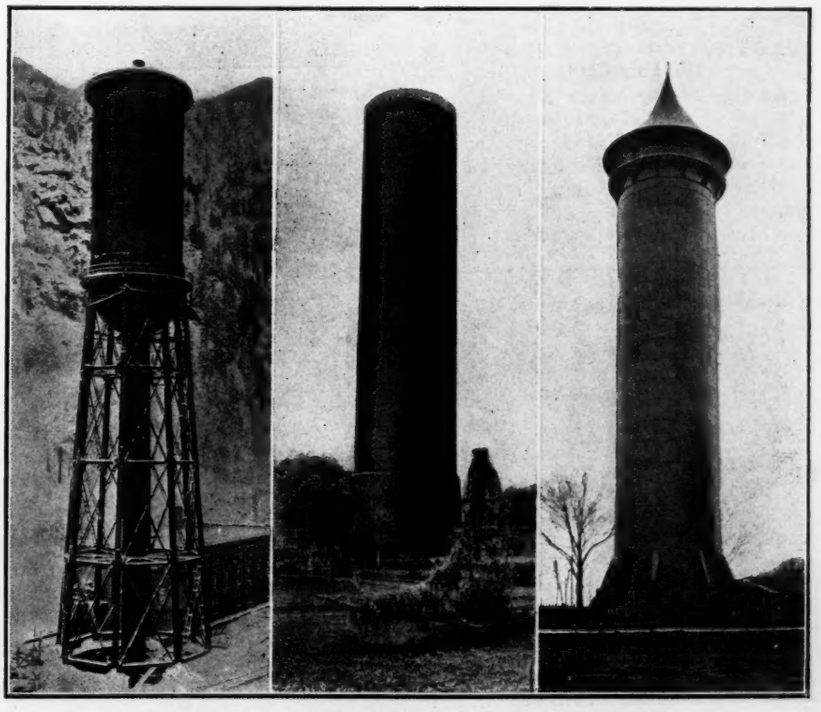
CEMENT-LINED PIPE.

It is claimed that cement-lined pipe makes a desirable conveyor for water because the cement lining does not chemically interact with the water and the pipe itself is strengthened. The MacBee Cement-Lined Pipe Co. P. O. Box 1184, Boston, Mass., exhibited at the recent convention of the New England Waterworks Association specimens of cement-lined, wrought-iron service pipe from ¾ inch to 3 inches in diameter, cement-lined malleable iron fittings of the same sizes and short lengths of 6-inch, 8-inch and 12-inch, cement-lined, cast-iron main. A piece of lined wrought-iron pipe which had been in the ground for over forty years and been pulled up for alterations, was shown to be in good condition. The lining is accomplished with a press 5 inches in diameter and 18 inches long, mounted on an 18-foot plank. The press is filed with soft plastic cement which is forced into the pipe by means of a piston. From the other end a length of pipe keeps the cement back as far as another would be fitted, usually about 6 threads. A stiff is pressed through the cement and then two cones, the forward one of which is fitted with projecting fins for centering, are pulled through and the extra cement forced out. The pipe is thus lined with a coating ⅛ inch thick and left to harden.

The pipe thus made may be safely shipped and laid. It can be bent in long, easy bends. All pipes are lined with a coupling made up at one end with the threads left clear for the next pipe. Cement-lined fittings, such as tees, elbows and couplings, are also made. Pipe and fittings have a square cement joint, so that a continuous cement surface is formed. Outside protection is obtained with an anti-rust compound, so that pipe may be buried in any kind of wet ground. The illustrations show cross-sections of pipe and fittings.

A WATER METER TESTING MACHINE.

The Ford Meter Testing Machine is calculated to supply the need of a simple, rapid and accurate, yet comparatively inexpensive testing machine for those cities which do not wish to expend a large sum and which do not want to rely on home-made, unsatisfactory outfits. The standard No. 4 machine, here illustrated, is so arranged that one one-inch and three ⅝-inch or ¾-inch meters may be tested simultaneously and with the same water or any may be tested separately. This meter-testing plant consists of a



THE USE OF GRAPHITE SILICA PAINT.
Leavenworth, Kans. Marion, O. Lancaster, Pa.

cast-iron table 16 inches by 5 feet 4 inches, supported by two heavy cast-iron pedestals. Securely fastened to this are four meter yokes, the first fitted to take any one-inch standard meter and the next three any ⅝-inch or ¾-inch meters. The inlet port is controlled by a one-inch Mueller inverted core valve as is also the one-inch by-pass extending up from the outlet end of the first yoke and over the other yokes to the discharge point. The ¾-inch outlet valve is of the same make and pattern. At the outlet end of the last yoke is a vertical bronze plate 1¼ inches wide with seven different sized and accurately calibrated holes through it from 3/32 to ¾ inch in diameter. By a simple device this strip can be placed at any desired point, causing the water to flow through any desired hole. At the outlet end of each yoke is a small pet cock and when the plant is full of meters ready for test, meters and plant are completely filled with water. The stop cock of the yoke is then opened and enough water drawn through to make the test hand on last meter read to some exact tenth of a foot or zero. The next meter towards the inlet is served similarly and so on until all meters are "set." The readings are recorded and the test made either by drawing through a known amount or measuring a recorded amount.

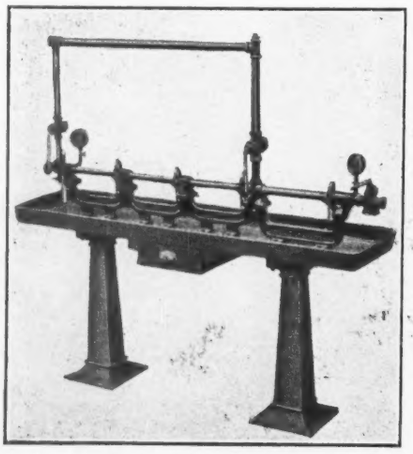
The plant weighs 350 pounds and is equipped with two 200-pound guages and all necessary connections. All ports are brass lined and all connections and fittings of brass, all parts being tested to stand 200 pounds pressure. The special features claimed for this tester are the ease of adjusting for the different sizes; the easy, durable valves, and the convenient design. The Ford Meter Tester is made by the Ford Meter Box Co., Wabash, Ind.

PROTECTION OF EXPOSED SURFACES.

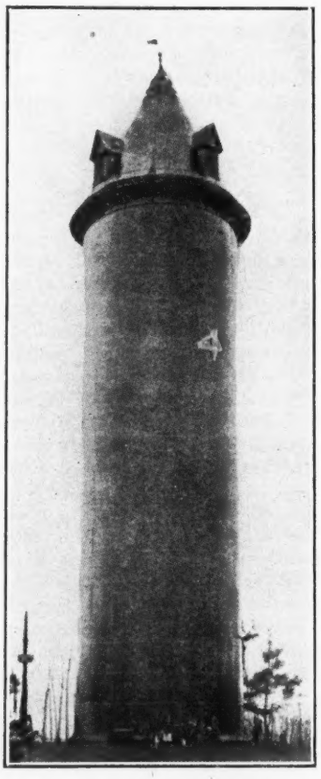
By Use of Bitumastic Enamel.

The prevention of exterior corrosion due to electrolysis has become a serious problem with the heavy multiplication of underground electrical conductors and interior tuberculation is perhaps even more extensive. The decrease in carrying capacity due to roughness of the interior and the weakening of the pipe by corrosion are not checked for more than a few years by the ordinary "coal tar dip." The coating is extensively abraded between the dipping and the laying. For over twenty-two years steel protected by Bitumastic Enamel, it is claimed, has withstood deterioriation.

Bitumastic Enamel has been used extensively on marine work, docks and the Gatun locks of the Panama Canal. The painting of standpipes is a source of expense and trouble and Bitumastic



METER-TESTING APPARATUS.



STANDPIPE, READING, MASS.
Bitumastic Enamal Used.

Enamel has found a wide use in this field. The illustration shows a 140-foot standpipe at Reading, Mass., which was recently coated on the inside with Bitumastic Enamel and on the outside with two coats of Bitumastic Solution. The latter is not as heavy and permanent a coating as the enamel and is used under conditions not severe enough to warrant the use of the enamel. Bitumastic Enamel has been successfully used in Great Britain. A good example, here illustrated, is that of the sludge tanks of the Dalmuir works of the Glasgow Sewage Department, which were treated in 1904. The New York Board of Water Supply has specified Bitumastic for protecting both sides of the "Narrows Siphon" of the Catskill Aqueduct under New York Harbor, which will consist of 10,000 feet of 3-foot cast-iron pipe.

Bitumastic Enamel has been tested in solutions of sulphuric acid, chloride solution and alkaline sulphate solution for 14 days at room temperature and was found to be unaffected. In using, no field coat of bituminous paint is needed at the joints or abraded points. After riveting, Bitumastic is applied. Bitumastic is used directly before lowering so that there is no abrasion due to transit, and in cases of very large conduits the enamel is applied after laying.

Bitumastic Enamel is made by the American Bitumastic Enamels Co., 322 So. Delaware St., Philadelphia, and 17 Battery Place, New York.

INDUSTRIAL NEWS

Cast Iron Pipe.—St. Louis—San Diego has placed an order for about 300 tons with the U. S. Cast Iron Pipe & Foundry Co. Municipal projects are being delayed by difficulty in selling bonds. Quotations: 6-inch and over, $32 per net ton; 4-inch, $34. New York—Washington, D. C., opened bids for 1,000 tons of 8-inch and Yonkers, N. Y., for 300 tons of 8-inch. Quotations: 6-inch, $20.50 to $21 per net ton.

Lead.—Quotations: St. Louis, $3.70; New York, $3.875.

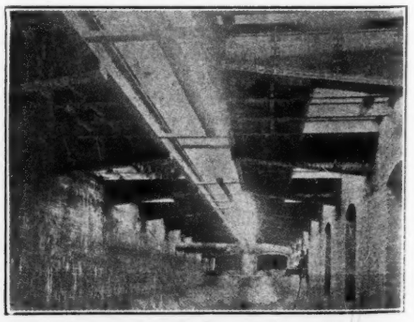
Pittsburg Meter Co., East Pittsburg, Pa., makers of the "Keystone" and "Eureka" water meters, is issuing to waterworks men a circular giving useful suggestions for setting water meters. Hints for setting meters under various conditions are offered.

NEWS OF THE SOCIETIES.

(Continued from page 435.)

Donnell, Kansas City. "Compensation of Municipal Officers in Cities and Towns," by Hon. J. G. Glasgow, mayor, Washington. "Workmen's Compensation and the Municipality," by Hon. Warren Garst, Iowa industrial commission, Des Moines. "Is Present Municipal Bond System the Best?" by Hon. Harry Stanberry, commissioner, Mason City. "Municipal Accounting," by Hon. R. L. Degon, auditor, Waterloo. "Division of Powers Delegated to Mayor and Council," by Hon. George A. McIntyre, mayor, Shell Rock.

President, Parley Sheldon, mayor of Ames; vice president, Mayor J. F. Cole, of Oelwein; secretary and treasurer, Frank G. Pierce, re-elected; trustee (term of three years), John F. Ford, mayor of Fort Dodge.



CATCH PIT, GLASGOW SEWAGE PLANT.

ADVANCE CONTRACT NEWS

ADVANCED INFORMATION BIDS ASKED FOR

CONTRACTS AWARDED ITEMIZED PRICES

To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL		NATURE OF WORK	ADDRESS INQUIRIES TO
				STREETS AND ROADS.	
O.,	Cleveland	10 a.m., Sept.	26.	Improving one road	E. F. Krause, Clk. Co. Comrs.
Ill.,	Antioch	2 p.m., Sept.	26.	Grading, draining and hard gravel road	C. F. Richards, Twp. Clk.
N. Y.,	Rome	7.30 p.m., Sept.	28.	Paving one street	Bd. Public Works.
Va.,	Gate City	Sept.	28.	Grading about 45 miles	G. P. Coleman, State Highway Comr., Richmond.
Ala.,	Montgomery	Sept.	28.	Grading and graveling about 11 miles road	T. H. Edwards, Co. Engr.
O.,	Zanesville	Noon, Sept.	28.	Grading, paving and curbing one avenue	Dir. Pub. Service.
O.,	Steubenville	Noon, Sept.	28.	Three paving contracts	J. P. Gavin, Dir. Pub. Ser.
Idaho,	Boise	Noon, Sept.	28.	22 miles road in Ada Co., and 20 miles in Canyon Co.	W. L. Gifford, Sec. State Com.
Tex.,	Houston	10 a.m., Sept.	28.	Furnishing 2,400 cu. yds. shell, also hauling and spreading	H. L. Washburn, Co. Aud.
N. D.,	Grafton	7 p.m., Sept.	28.	Street grading, also 600 ft. sewers	J. H. Johnson, Co. Aud.
Wis.,	Fond Du Lac	3 p.m., Sept.	28.	Constructing sidewalk intersections	J. F. Hohensee, City Clk.
O.,	Lorain	Noon, Sept.	29.	Grading, draining and curbing with vit. brick or asphalt	L. B. Johnson, Clk.
Ill.,	Springfield	11 a.m., Sept.	29.	Six contracts for state aid roads	State Highway Com.
Ill.,	Smynes	2 p.m., Sept.	29.	300 ft. gravel road, one 8 ft. concrete culvert, and one 20 ft. concrete bridge	E. D. Barkley, Com. Hig.
Wash.,	Seattle	10 a.m., Sept.	29.	Constructing one road	B. Phelps, Clerk.
O.,	Waldo	Sept.	29.	Paving one street with vit. brick or block or asphalt on concrete, about 5,450 sq. yds.	T. H. Mears, Engr., Marion.
Neb.,	Kearney	Sept.	29.	Road work	Clerk Co. Comrs.
O.,	Columbus	Noon, Sept.	29.	Constructing about 5 miles road	J. Scott, Clk. Co. Comrs.
O.,	Norwalk	10.30 a.m., Sept.	29.	Improving one road	Co. Comrs.
O.,	Piqua	10 a.m., Sept.	29.	Cresoted wood block floor on bridge	M. T. Staley, Co. Aud.
O.,	Columbus	Noon, Sept.	29.	Use of asphalt plant for period ending June 1, 1915	S. A. Kinnear, Dir. Pub. Serv.
O.,	Troy	10 a.m., Sept.	29.	Creosoted wood block floor on bridge	M. T. Staley, Co. Aud.
Ind.,	Hammond	10 a.m., Sept.	30.	Cement sidewalk along one street	Board Public Works.
Ind.,	Tipton	10 a.m., Oct.	1.	County line roads	D. W. Baxter, Co. Aud.
W. Va.,	N. Cumberland.	About Oct.	1.	Two miles brick road with stone or cement curb; cost, about $22,000	A. S. Cooper, Clk.
Ill.,	Danville	About Oct.	1.	43,000 sq. yds. brick paving, reinforced concrete tunnel, 1,300 ft. long, cost about $160,000; also second job of 14,000 sq. yds. brick paving	W. Martin, City Engr.
Ill.,	Oakland	About Oct.	1.	15,000 sq. yds. brick paving and 15,000 ft. concrete curb and gutter	C. L. James, Engr., Mattoon.
Kan.,	Coffeyville	Noon, Oct.	1.	Road improvements in Montgomery County	G. A. Otwell, Co. Clk.
Ala.,	Double Springs	Oct.	2.	Grading, draining and surfacing with sand clay, cost about $5,380	County Comrs.
O.,	Cincinnati	Noon, Oct.	2.	Improving one avenue	A. Reinhardt, Clk. Co. Comrs.
O.,	Dalton	6 p.m., Oct.	2.	Repairing & constructing sidewalks in number of streets.	E. F. Scott, Vil. Clk.
N. J.,	Trenton	2.30 p.m., Oct.	2.	Supplying and delivering broken stone, also constructing concrete curbs	F. Thompson, City Clk.
O.,	Cleveland	10 a.m., Oct.	3.	Repairing and improving one road	E. G. Krause, Clk.
Cal.,	San Francisco	Oct.	5.	Constructing about 70 miles of highway in several counties	State Highway Com.
Ind.,	Brownstown	1 p.m., Oct.	5.	Two roads in one township	A. Lendtke, Co. Aud.
O.,	Jefferson	1 p.m., Oct.	5.	Grading, draining and paving two roads	Co. Comrs.
Ind.,	Vincennes	4 p.m., Oct.	5.	29,000 sq. yds. paving on 5-inch concrete base	H. T. Watt, City Engr.
Ind.,	Tipton	10 a.m., Oct.	5.	Gravelling part of road	T. H. Trambarger, Aud.
Ind.,	Vevay	1 p.m., Oct.	5.	Grading, draining and paving with stone and gravel	Co. Comrs.
Ind.,	Wilamac	Noon, Oct.	6.	Grading, draining and improving in three townships	W. E. Munchenburg, Co. Aud.
Ind.,	Rensselaer	2 p.m., Oct.	6.	Improving stone road in one township	J. P. Hammond, Co. Aud.
Minn.,	Hastings	1.30 p.m., Oct.	6.	Constructing state road	P. A. Hoffman, Co. Aud.
Ind.,	Fort Wayne	10 a.m., Oct.	6.	26,344 ft. stone road improvement	C. H. Brown, Co. Aud.
Fla.,	Titusville	Oct.	6.	Grading and stulling 2,630 ft. roadway	J. P. Wilson, City Clk.
Pa.,	Harrisburg	Oct.	6.	Constructing 1,050 ft. brick block pavement in Forest County, and about three-quarter mile brick block pavement in Erie County	State Highway Dept.
N. D.,	Bismarck	2 p.m., Oct.	6.	Grading several streets	T. E. Flaherty, Co. Aud.
Minn.,	Little Falls	10 a.m., Oct.	7.	Grading and claying state road	D. Roshleau, Co. Aud.
Ind.,	Shelbyville	11 a.m., Oct.	7.	Improving 12,720 ft. highway and also Williams road	F. W. Fagel, Co. Aud.
O.,	Cleveland	10 a.m., Oct.	7.	Improving one road	E. G. Krause, Clk.
O.,	Cincinnati	Noon, Oct.	9.	Repairing pipe	F. E. Wesselmann, Pres. Bd. Co. Comrs.
Ala.,	Hamilton	10 a.m., Oct.	9.	Grading and draining 50 miles road	County Comrs.
Ind.,	Warsaw	2 p.m., Oct.	9.	Constructing nine miles road	B. D. Mock, Co. Aud.
O.,	Silverton	Noon, Oct.	9.	3,240 sq. ft. cement sidewalks	A. A. Sprague, Vil. Clk.
Ind.,	Indianapolis	10 a.m., Oct.	10.	Gravelling and macadimizing two highways	F. M. Williams, Delaware Co. Aud.
Ind.,	Valparaiso	10 a.m., Oct.	10.	Grading, paving and improving road in one township	C. A. Blachly, Co. Aud.
O.,	Youngstown	10 a.m., Oct.	12.	Grading one road	County Comrs.
O.,	Sandusky	1.30 p.m., Oct.	12.	Improving 2,945 ft. road to cost about $2,260; also placing creosote floor on bridge	H. M. Adams, Aud., Erie Co.
Ala.,	Ozark	11.30 a.m., Oct.	14.	Grading, draining and sandclaying road	Court of Comrs.
Ind.,	Monticello	10 a.m., Oct.	26.	Grading, draining and improving road in one township	A. G. Fisher, Co. Aud.
				SEWERAGE	
Minn.,	Redwood Falls.	1 p.m., Sept.	26.	Constructing drainage ditch to cost $3,396	L. P. Larson, Co. Aud.
O.,	East Liverpool	Noon, Sept.	26.	Sanitary sewers in three streets	E. J. Smith, Dir. P. S.
Tex.,	Houston	10 a.m., Sept.	28.	Six, eight and ten-foot culverts, and 24-inch corrugated iron pipe	H. L. Washburn, Co. Aud.
D. C.,	Washington	Sept.	28.	Constructing trunk sewers, including 6,235 ft. brick and concrete construction from 27 to 36-in.	Dist. Comrs.
Ia.,	Adele	6 p.m., Sept.	28.	10-in. vit. clay pipe sewer, 941 ft. long, and 12-in., about 2,083 ft. long, catch basins, etc	V. T. Sweeley, City Clk.
Ia.,	Eagle Grove	Sept.	28.	8-inch bell tile sanitary sewers	T. Middleton, City Clk.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
O.,	Columbus	Noon, Sept. 29.	Incinerator plant	S. A. Kinnear, Dir. Pub. Ser.
N. Y.,	Fairport	Sept. 30.	Constructing sewers	C. F. Fisher, Village Engr.
O.,	Cincinnati	noon, Sept. 30.	Improving one street by sewering, and constructing brick pavement	P. Fosdick, Dir. Pub. Serv.
Ia.,	Creston	8 p.m., Sept. 30.	About 37,000 ft. sanitary sewer from 6 to 12-inch, 44 manholes, and 26 lamp holes	T. S. DeLay, City Engr.
Ia.,	Algona	2 p.m., Sept. 30.	About 50,000 ft. 6-32-inch tile drain	D. E. Norton, Co. Aud.
Ala.,	Bay Minette	Sept. 30.	Constructing water works, sewers & electric light plant.	W. D. Stapleton, Mayor
N. Y.,	Schenectady	2.30 p.m., Sept. 30.	Two vertical centrifugal pumps with caps, 7,000 gals. per minute, and one vertical centrifugal pump, 3,500 gals. per minute, also motors, etc.	Bd. Contract & Sup.
Ky.,	Louisville	About Oct. 1.	Constructing 1,000 ft. 24 and 28-in. pipe sewer and 1,500 ft. 30 to 39-in. concrete sewer	R. W. Burke, Asst. C. E.
La.,	New Orleans	Noon, Oct. 2.	Making extensions to drainage station	F. S. Shields, Sec. Sew. & Water Board.
Ia.,	Knoxville	1.30 p.m., Oct. 5.	Constructing one ditch	J. D. Schlotterback, Co. Aud.
Tex.,	San Antonio	Oct. 5.	About 60,000 ft. sanitary sewer from 8 to 66-in.	City Clerk.
Neb.,	Tecumseh	6 p.m., Oct. 6.	10-inch pipe sewers on one street	J. C. Moore, City Clk.
Neb.,	Gothanberg	6 p.m., Oct. 6.	Sewer extension amounting to 2,148 ft.	H. C. Loutsenheiser, City Clk.
N. J.,	Plainfield	8 p.m., Oct. 7.	Constructing trunk sewer and disposal works for three places	G. W. Fuller, Engr.
N. J.,	Plainfield	Oct. 7.	Trunk sewer and disposal works	G. W. Fuller, N. Y.
O.,	Fostoria	Noon, Oct. 9.	Constructing dam for reconstructing screen chamber, remodelling sewer reservoir into Imhoff tank, erecting pump, etc.	E. K. Cunningham, Dir. P. S.
Mich.,	Harbor Springs	Oct. 9.	Constructing sewers in four streets	V. A. Pool, Vil. Clk.
Ark.,	Texarkana	11 a.m., Oct. 10.	Drainage canals and laterals	L. Kirkland, Chr. Drain. Dist.
O.,	Columbus	Noon, Oct. 12.	Motor driven centrifugal pumping machinery for sewerage station to include pumps from 5 to 15 million gallons capacity	S. A. Kinnear, Dir. Pub. Ser.
Ia.,	Clinton	8 p.m., Oct. 13.	1,110 ft. 18-inch vitrified sewer pipe, etc.	F. W. Leedham, City Clk.
Ia.,	Knoxville	1.30. p.m., Oct. 15.	Constructing ditch, length about 6 miles	W. O. Price, Constr. Engr.
Minn.,	Albert Lea	Oct. 16.	10,772 ft. 10 to 24-inch clay tile	R. G. Lingdren, Engr.
La.,	New Orleans	Noon, Nov. 14.	Sewer extensions, water extensions, connections to sewers and water mains, etc.	F. S. Shields, Sec. Sew. & Water Board.

WATER SUPPLY.

Tex.,	El Paso	Sept. 27.	Water works machinery, including air compressors, 4,000,000 gal. pumps and engines	C. W. Fassett, City Clk.
Neb.,	Hastings	Sept. 28.	1,630 ft. main, 4-inch; 1 hydrant, and 2 water gates; cost about $1,500	W. H. Fuller, Asst. City Engr.
Neb.,	Bridgeport	Sept. 28.	Furnishing and delivering 8,000 ft. 4-in. Class D bell and spigot c.-i. water pipe, 4,500 lbs. special castings, 10 4-in. gate valves, 12 fire hydrants, 4-in. hub, etc.	Board Village Trustees.
Miss.,	McComb	Sept. 29.	Concrete reservoir	X. A. Kramer, Engr., Magnolia
N. J.,	Belleville	9 p.m., Sept. 29.	Laying c.-i. water pipe, 6 to 12-inch, on about nine streets, and resetting valve boxes, etc.	E. E. Mathes, Twn. Clk.
Ia.,	Grand Mount	Sept. 29.	Installing water works system, including 50,000 gal. steel tank	R. C. Quinn, Town Clk.
Utah,	Salt Lake City	Oct. 1.	Constructing reservoir, 10,000,000-gallon capacity; two 36-in. valves, concrete pipe and c.-i. pipe	S. Q. Cannon, City Engr.
N. J.,	Atlantic City	Oct. 1.	Increasing impounding area of pond	Board Comrs.
Ia.,	Stanton	8 p.m., Oct. 1.	Water works system, 3,617 ft. 6-in., 6,113 ft. 4-in. pipe, 6,500 specials, 19 hydrants, steel tank and tower, pump, engine or motor	T. S. DeLay, Consulting Engr., Creston.
Okla.,	Goodwell	2 p.m., Oct. 1.	Extending water system, including 6,000 gallon steel tank on 30-foot tower	B. Hennessey, Sec. Bd. Agr., Oklahoma City.
O.,	Brewsters	About Oct. 1.	Water works system; cost $10,000	W. J. Sherman, Co. Engr., Toledo.
O.,	Fostoria	About Oct. 1.	140 million gallon capacity zig-zag on concrete reservoir.	C. Latshaw, City Engr.
Wis.,	Wabeno	2 p.m., Oct. 1.	Constructing water works plant, including pipe, hydrants, valves, etc.	N. H. Smith, Engr., Oshkosh.
S. C.,	Port Royal	Oct. 3.	Furnishing steel stacks for boilers	Bureau Yards & Docks, Navy Dept., Wash., D. C.
Pa.,	Coopersburg	7 p.m., Oct. 5.	Extending water mains	M. L. Engleman, Sec. Council.
H. I.,	Pearl Harbor	10 a.m., Oct. 6.	Furnishing water meter	Bureau Sup. & Accts., Navy Dept., Wash., D. C.
O.,	Cleveland	Noon, Oct. 7.	Three low lift steam turbine reduction gear driven centrifugal pumps for water department	Comr. Pur. & Supplies.
Ill.,	Oglesby	8 p.m., Oct. 12.	Artesian well, about 1,650 ft. deep	J. Corgiat, City Clk.
Kan.,	Little River	About Nov. 1.	Constructing water system, cost $25,000	W. B. Rollins, Cons. Engr., Kansas City, Mo.

LIGHTING AND POWER.

Fla.,	Key West	11 a.m., Sept. 26.	Furnishing and erecting 200 h.-p. water tube boiler	Bureau Yds. & Docks, Navy Dept., Wash., D. C.
D. C.,	Wash. Barracks.	1 p.m., Sept. 28.	Motor driven ventilating coupled to induction motor	Lieut. Col. J. E. Kuhn, U. S. Engr.
N. Y.,	Ithaca	2 p.m., Sept. 28.	Electric work, heating and plumbing, also construction drill hall	E. L. Williams, Cornell Univ.
Cal.,	San Francisco	Sept. 29.	Furnishing internal combustion engines	Light House Inspector.
O.,	Cleveland	Noon, Oct. 2.	Rubber-covered lead encased cable	A. R. Callow, Comr. P. & Sup.
S. D.,	Alexandria	Oct. 5.	Furnishing and installing complete municipal electric light system	H. M. Shoemaker, City Aud.
R. I.,	Narragansett Pier	Oct. 7.	Lighting fixtures, and construction complete of post office	O. Wenderoth, Supt. Arch., Washington, D. C.
O.,	Columbus	Noon, Oct. 12.	Furnishing motor driven centrifugal pumping machinery.	S. A. Kinnear.
Australia,	Melbourne	Oct. 14.	Furnishing and delivering low tension cables and instruments, also fuses, etc.	P. McBride, Agent, Gen., Victoria Melbourne Place, London, E. C.
Neb.,	Lincoln	Oct. 15.	Improvements to light and water plant	T. H. Berg, City Clk.

FIRE EQUIPMENT.

O.,	Marietta	Noon, Sept. 26.	One gasoline tractor, to cost about $3,000	Director Public Safety.
N. J.,	Elizabeth	8 p.m., Oct. 5.	One triple combination pumping, one combination pumping engine and hose wagon, one combination chemical and hose, one chief's runabout, all to be motor driven	Council Com. on Finance.

BRIDGES.

Cal.,	San Bernardino	11 a.m., Sept. 28.	Reinforced concrete bridge	Board Co. Supv.
Tex.,	Houston	10 a.m., Sept. 28.	Nine concrete bridges	H. L. Washburg, Co. Aud.
Pa.,	Allentown	9 a.m., Sept. 28.	Constructing number of bridges	Co. Comrs.
N. Y.,	Rochester	Oct. 1.	Constructing bridge at Charlotte	Co. Comrs.

BIDS ASKED FOR

STATE	CITY	REC'D UNTIL	NATURE OF WORK	ADDRESS INQUIRIES TO
Kan.,	Coffeyville	Noon, Oct. 1.	Constructing six bridges in Montgomery County	G. A. Atwell, Co. Clk.
O.,	Cincinnati	Noon, Oct. 2.	Concrete bridge over Mill Creek	A. Reinhardt, Clk. Co. Comrs.
Kan.,	Leavenworth	Noon, Oct. 5.	Constructing fourteen bridges and two culverts	J. A. Hall, Co. Clk.
Ont.,	**Toronto**	**Noon, Oct. 5.**	**Bridge over Bloor Street**	**H. C. Hocken, Mayor.**
Ind.,	Knox	2 p.m., Oct. 6.	Constructing four bridges	T. T. Scott, Knox Co. Aud.
Minn.,	Little Falls	2.30 p.m., Oct. 6.	Constructing state bridge 35 ft. span, 18 ft. roadway	B. Y. McNairy, Co. Aud.
Pa.,	Elwood City	Oct. 8.	Constructing bridge with concrete arch at each end	T. A. Gilke, Engr.
Pa.,	New Castle	2 p.m., Sept. 8.	645-foot bridge, with concrete arches on either side	J. R. Lamoree, Clk. Co. Comrs.
O.,	Dayton	10 a.m., Oct. 15.	Constructing superstructure of bridge	W. H. Asling, Sec. Co. Comrs.
Tenn.,	Chattanooga	10 a.m., Oct. 22.	Constructing one bridge	Tennessee River Bridge. Com.
Kan.,	Ottawa	Oct. 29.	Constructing stone pier substructure and one concrete abutment of bridge	J. E. Roose, Co. Aud.

MISCELLANEOUS.

S. C.,	Charleston	11 a.m., Sept. 26.	Three 15-ton locomotive cranes	H. R. Stanford, Ch. Bur. Yds. & Docks., Navy Dept., Washington, D. C.
Tex.,	Amarillo	3 p.m., Sept. 28.	Constructing complete 3-story post office and Court House	O. Wenderoff, Sup. Arch., Treas. Dept., Wash., D. C.
Ill.,	Chicago	11 a.m., Sept. 29.	Delivering lime until December	L. E. McGann, Comr. P. S.
Cal.,	San Francisco	Sept. 30.	Constructing Twin Peaks tunnel (date extended)	City Engineer
D. C.,	Washington	3 p.m., Sept. 30.	Supplying metal vault equipment for stamp vault	O. E. Wenderoth, Supv. Arch., Washington, D. C.
La.,	Alexandria	Oct. 1.	Erecting three-story brick school	School Board.
D. C.,	Washington	11 a.m., Oct. 3.	Shipbuilding cranes at Boston and Philadelphia	H. R. Stanfordt, Bur. Yds. & Docks, Navy Dept.
Pa.,	Pittsburgh	Noon, Oct. 3.	Steel lock gates, valves and lock operating machinery	Lieut.-Col. F. R. Shunk, Boro. Engr., U. S. A.
N. Y.,	New York	Oct. 6.	Constructing section of Lexington Avenue subway	Public Service Commission.
D. C.,	Washington	Oct. 6.	132,000 dark red hard burned bricks, 4,260 lbs. copper trolley wire, feed pumps, five hydraulic cranes, etc.	Bureau Sup. and Accounts, Washington, D. C.
W. Va.,	Athens	Oct. 8.	Erecting auditorium and two-story right wing, both of brick and reinforced concrete	State Bd. Cont. Charleston.
D. C.,	**Washington**	**2 p.m., Oct. 15.**	**Collection and disposal of garbage, etc.; optional period.**	**District Comrs.**
Pa.,	Philadelphia	Oct. 16.	Garbage disposal	Morris L. Cook, Dir. Pub. Wks.

STREETS AND ROADS

Gadsden, Ala.—Ordinance has been passed to provide for certain improvements on Walnut St., from west line of intersection of 5th and Walnut Sts. to west line of the intersection of Walnut and 12th Sts., and at street intersections between said points. Jos. Balfour is City Clerk.

Gadsden, Ala.—The Etowah County Commissioners have called special election for Nov. 3 on question of issuing $200,000 in good roads bonds and on question of issuing $25,000 in bonds for construction of county hospital.

Alameda, Cal.—Recommendation that an asphalt plant be erected by city will be made by street committee to City Council and Mayor at next meeting of latter body. It is planned to resurface all of streets and avenues and experts said this could be done at great saving by city owning its own plant.

Alameda, Cal.—Council has decided to submit to people bond issue to vote $100,000 for improvement of Central Ave. from High St. to 4th St.

Benecia, Cal.—Paving bond issue in sum of $10,000 will be voted on Oct. 12.

Hollister, Cal.—Building of improved highway from San Joaquin Valley to Monterey Bay by way of Pacheco Pass is being discussed.

Pasadena, Cal.—Bids have been opened for work on Ashtabula St., S. Pasadena Ave. and Palisades St. and have been referred to Commissioner T. D. Allin, of Public Works Department, for his recommendations. Bids are as follows: Ashtabula St., sidewalk—Claude A. Rothrock, .089 per sq. ft; Geo. Halloway, .087 per sq. ft.; J. E. Hadock, .09¾ per sq. ft. S. Pasadena Ave., paving and curb—Geo. R. Curtis, curb, 27c.; paving, 18.7c.; Andrew Holloway, curb, 30c.; paving, 17.6c. Palisades St., sidewalk—Claude A. Rothrock, .082 per sq. ft.; Geo. Holloway, .082 per sq. ft.; Wm. Powell, .085 per sq. ft.; J. C. Kinsman, .09 per sq. ft.; J. E. Haddock, .095 per sq. ft.

Pasadena, Cal.—Resolutions of intention have been introduced for cement sidewalk on Cypress, from Orange Grove to Lincoln Avenue Terrace tract, and for grading, curbing and paving Linda Vista Ave., from Grand Ave., 886 ft. west.

Riego, Cal.—Sutter County Supervisors have selected the route for proposed highway from Riego to Yuba City and across the river to Meridian, and electors will probably be called on in November to vote on proposition to issue $700,000 worth of bonds.

Sacramento, Cal.—Board of Supervisors have adopted resolution calling for bond election for $2,425,000 for construction of roads designated in report of Sacramento County Highway Commission. Date of election was set for Oct. 16. Report of Sacramento County Highway Commission, with additions which designate roads and include specifications for construction, also have been adopted.

Sacramento, Cal.—Bill calling for appropriation of $15,000 for construction of state roads between Emigrant Gap and McKinney's at Lake Tahoe, and from Auburn to Emigrant Gap, will be introduced at next Legislature by Senator Birdsall, of Auburn.

Sacramento, Cal.—Conceding right of the people to know details of what their money was to be spent for before passing on proposed $2,425,000 highway bonds, County Highway Commission have amended its previously submitted report, giving important details of construction, naming materials, setting forth estimates and adding probable cost of bridges and culverts. Board of Supervisors and Commission have reached tentative agreement for calling of road bond election for Oct. 16.

San Francisco, Cal.—Board of Works has ordered following street improvements: Paving of Arguello Blvd., between Turk and Geary Sts., San Bruno Ave., 18th St., Green St., 10th Ave., Chestnut St., Sanchez St., Underwood Ave., and 18th Ave., and sidewalks on O'Farrell St., Bay St., and Larkin St. Board has recommended to Supervisors reconstruction by street repair department of pavement on Webster St., between Hayes and Oak St., Perry from Third to Fourth, Powell from Broadway to the Embarcadero and Broadway from Powell to Mason.

Stockton, Cal.—New specifications have been made for improving of Weber Ave.

Upland, Cal.—New bids will be received by Board of Trustees of Upland up to Sept. 16 for paving and constructing cement curbs and gutters and corrugated iron culverts in 12th St. from Euclid Ave. to east city limits. Only one bid was received under previous advertisement and was rejected as being too high. Bid was presented by W. C. Cline and was 14 cts. for paving, 3.5 cts. for oiled shoulders, 18 cts. for curbs, 13.5 for gutter and $1,000 for culverts.

Yuba City, Cal.—Supervisors having selected route which they prefer, it is quite probable that electors of Sutter Co. will, at November election, vote upon proposition of issuing bonds to build new road from Riego by way of Nicolaus to Yuba City and across country to Meridian. Scheme includes bridge across Feather River at Nicolaus. It is estimated that cost of highway can be kept within $700,000. Bridge, which will be about 2,800 ft. long, will cost $110,000.

Stamford, Conn.—City Clerk has been directed to communicate with State Highway Commissioner and request that Boston Post Rd., between Glenbrook Rd. and Noroton Hill, be rebuilt this year.

Wilmington, Del.—Improvement bonds in sum of $50,000 have been sold over counter.

Jacksonville, Fla.—The opening up of four miles of roadway in Duval county between Dinsmore and Keens mill to afford a fair highway from Jacksonville to St. George, Ga., has been recommended by good roads committee of Jacksonville Board of Trade to board of county commissioners.

Pensacola, Fla.—City is in the market for about 50,000 ft. of timber for making of creosoted wood blocks for paving of Main St. between Jefferson and Palafax Sts.

Tavares, Fla.—At meeting of Board of County Commissioners of Lake county engineers were selected to make surveys, profiles, plans and prepare specifications covering good roads to be built under recent bond issue and to supervise construction. In addition to $500,000 bond issue, which citizens of Lake county have voted for purpose of good roads construction, there will be about $100,000 income from taxes during period of construction, making total expenditure of $600,000.

Zephyrhills, Fla.—People have voted in favor of hard roads. About 15 miles will be added to Pasco county system.

Augusta, Ga.—Ordinance has been adopted to provide for construction and laying down of curbing on both sides of Whitney St., from Central Ave. to Wrightsboro Rd.

Macon, Ga.—See "Miscellaneous."

Morgan, Ga.—Road and bridge bond issue in sum of $100,000 will be voted on Sept. 26.

Rome, Ga.—Extensive work will be done by city in laying of sidewalks, the permanent grading of streets, and placing of curbs and gutters.

Fort Wayne, Ind.—Paving of St. Mary's Ave. has been ordered.

Fort Wayne, Ind.—Resolutions have been confirmed for laying of cement sidewalks on 13 streets.

Indianapolis, Ind.—Board of Public Works has ordered new plans for paving Kelley St., from Meridian St. to Bluff Rd.

Richmond, Ind.—Engineer has estimated cost of paving of Main St. from bridge to 4th St. at $7,860.89.

Richmond, Ind.—Petition has been presented to Board of Public Works for macadamizing of North Fourth St. from A to B Sts. This street will be repaired but not macadamized until next year.

Shelbyville, Ind.—Road improvement bonds valued at $4,480 have been sold by County Treasurer to Shelbyville Trust Co. at par and accrued interest.

South Bend, Ind.—Bids for resurfacing Marion St., from St. Joseph St. to east line of lot five, Hammond and Whit-

comb addition, have been opened by Board of Public Works and referred to engineer for tabulation.

Vincennes, Ind.—Board of Works has ordered paving of 4th St. from Willow to St. Clair.

Leavenworth, Kan.—Plans and specifications for paving and curbing Sixth St. from Choctaw to Oak Sts. have been presented to Commissioners and accepted.

Leavenworth, Kan.—City Clerk Kirmeyer has been instructed to prepare resolution providing for paving Choctaw St. from Main to Seventh Sts.

Elkton, Ky.—As result of meeting of citizens held at Claymour, 6 miles north of here, 5 miles of model dirt road will be constructed between that place and Elkton. Work will be under direction of Walter F. Brooks, the Federal Government engineer, now in the county, and will, it is estimated, cost $1,400, of which $700 will be paid by county and $700 through private subscriptions.

Hempstead, L. I.—Hempstead, Rockville Centre and Oceanside, in southern Nassau County, L. I., will be doubly joined to Long Beach, instead of by single road, as now, if bill to be presented to next legislature asking for $400,000 for purpose, passes, and sum asked for also includes cost of improvements to present highway between Rockville Centre and Long Beach, known as Long Beach road. Proposed new highway would consist of extension of Oceanside Ave.—or what was Christian Hook road—from its present terminus in central part of Oceanside south to and across Hempstead Bay to Long Beach. Proposed appropriation would also include cost of concrete viaduct aeross bay, which would have piers on certain hassocks there.

Baltimore, Md.—City is contemplating extensive improvements at Fort McHenry.

Chester, Mass.—Operations have been started by Massachusetts Highway Commission to improve highway between Chester and Middlefield, taking up work about a mile from Chester village and continuing about one-half mile to point where work was begun last year, and continuing as far beyond as appropriation will permit. It is understood that about $15,000 will be expended on five miles of road, modifying grade preparatory to putting in macadam next year.

Haverhill, Mass.—Alderman Wood will ask City Council to authorize him to macadamize Highland Ave., from Park St. to Kenoza, because of poor condition of street.

Marblehead, Mass.—A warrant has been posted calling special town meeting Sept. 25 to see if town will make appropriation of $3,000 for building Wyman and Bubier roads.

Taunton, Mass.—An order for bond issue of $10,000 for permanent highway work, in addition to work already done on highways, has been passed by Municipal Council. Apportionment among streets for the $10,000 as order now stands is as follows: Ingell St., $2,000; First St., $1,500; School St., $1,500; Monroe St., $1,500; Wales St., $1,250; Adams St., $1,250 and Westville, $1,000.

Kalamazoo, Mich.—Members of streets committee of City Council have practically decided to advertise for new bids for supplying of asphaltic concrete tops for four streets to be paved this year. Only two bids were submitted by contractors for the work, one coming from S. S. Saxton Co. of Richmond, Ind., and other from Globe Construction Co. of Kalamazoo. Saxton Co. bid was about 20 cts. lower per sq. than local company's price, being around 84 cts.

St. Joseph, Mo.—Ordinances have been adopted for paving of several streets.

Joplin, Mo.—Main St. is to be paved shortly from Broadway to 3d. Wood blocks probably will be used.

Joplin, Mo.—Oiling of streets next spring is being considered. City will receive bids from oil companies for great quantities of oil and material will be furnished contractors at minimum price.

Roswell, N. M.—Contract for paving of about 12 more blocks will be let in a few days.

Fremont, Neb.—The first stretch of cement road along Lincoln Highway west of Missouri River may be awarded to Fremont, and it may be two miles long.

Nashua, N. H.—After discussion of paving question as relates to resurfacing of Bridge St., Board of Public Works has rejected all of proposals for cement concrete road and voted to allow city engineer five days to find out whether mixing machine of sufficient capacity to make concrete can be hired. Two contractors bid on work. The Osgood Construction Co. of Nashua bid $1.58 a sq. yd. for concrete pavement on city engineer's specifications and Hassam Paving Co. of Worcester $1.60 for same. The Osgood Co. offered to do excavating at 59 cts. a cu. yd. and Hassam company at 65 cts. The Hassam company agreed to install Hassam paving on its own specifications at $1.65 a sq. yd., including excavating and reinforced concrete, at $1.75, including excavating.

Atlantic City, N. J.—Notice of intention to pave Aberdeen Place and Sunset and Winchester Aves., from Albany to Trenton Aves. will be given on October 1.

Bordentown, N. J.—Petitions are being circulated for improvement of Bordentown and Burlington Rd.

Elizabeth, N. J.—Comprehensive tables of bids recently received for asphaltic concrete resurfacing of most of city's telford streets, have been prepared by City Surveyor Collins for information of members of City Council. Finance and Streets Committees, together with other city officials, will consider what streets should be recommended for immediate improvement and to whom contracts should be awarded. Twenty-four streets, whose total length is 45,248 ft., almost 9 miles, were bid upon. Bidders and grand totals of the figures they submitted, were as follows: M. J. Leahy, New York, $197,755.26; Newton Paving Co., Trenton, $205,406.51; Continental Public Works Co., New York, $201,659.93; Hassam Paving Co., Worcester, Mass., $225,477.96; Uvalde Asphalt Co., New York, $229,230.96; Cleveland Trinidad Paving Co., Cleveland, O., $282,914.84; Sicilian Asphalt Paving Co., New York, $227,326.14; J. F. Shanley Co., Newark, $245,747.70; Union Paving Co., Schenectady, N. Y., $256,871.87. The price per square yard is not the same in every street except in the Leahy, Sicilian, and Hassan bids. Leahy's bid was $1.07 for every square yard to be resurfaced no matter where located; the Sicilian company's figure was $1.23 per sq. yd., and the Hassan concern submitted an estimate of $1.22 per sq. yd. The Continental Co.'s bid ranged from $1.08 per sq. yd. for First Ave., Franklin St., Marshall St., Second St., Pine St., and Court St., to $1.12 for Morrell St. and $1.20 for South Broad St. The Cleveland-Trinidad bid varied from $1.35 for First Ave., Marshall St., Franklin St., and Madison Ave., to $1.45 for Chilton St., Washington St. and Morrell St., $1.20 for South Broad St. The Uvalde bid goes from $1.20 for Stiles St. and Pearl St., to $1.28 for Pine St., Spring St. and Magnolia Ave. The Newton Paving Co. ranged in its bid from $1.09 for First Ave., Marshall St., Franklin St., Second St., Pine St., and Court St., to $1.17 for Westminster Ave. and Stiles St. All other streets are rated at $1.12 per sq. yd. by the Newton Co. The J. F. Shanley Co.'s lowest estimate was $1.30 upon First Ave., Marshall and Franklin Sts. With the exception of Madison Ave. at $1.32, all other streets in the Shanley bid were placed at $1.35 per sq. yd. The Union Paving Co.'s lowest figure was $1.38, and its highest, $1.48, for Washington St., Court St. and South Broad St. were put at $1.46; Chilton St., Second St., Cherry St. and Morrell St. at $1.44. With the exception of Marshall, Franklin, Prince and Mary Sts., and Irvington Ave., at $1.39, the rest of the streets were at $1.38 in the Union bid.

Elizabeth, N. J.—Finance and Streets Committees of City Council will hold joint meeting when street resurfacing project is scheduled for discussion. Report will likely be prepared as to what streets, if any, should be improved immediately. Bids have been received for resurfacement of almost every macadam and telford street in city.

Lawrence, N. J.—Repair of Lawrenceville road is urged.

Morrisville, N. J.—At meeting of Morrisville Borough Council it was finally decided to go ahead with work of laying sidewalk in front of Osborne property on north side of West Bridge St.

Passaic, N. J.—Ordinance has been passed for construction of concrete curb and flag and laying of asphalt-bound macadam upon Spring St.

Passaic, N. J.—City Clerk has been instructed to advertise for bids for improving Spring St.

Binghamton, N. Y.—County Superintendent of Highways Charles Van Amburgh has attached his signature to new plans for completion of Sanitaria Springs, Harpursville, Baker's Corners road. Advices have been received that original contract let to Hollington Construction Co., of Troy, had been cancelled by State Highway Department officials. New plans were prepared under direction of Division Engineer Howard E. Smith. It is expected that bids will be asked for at once, and that contract will be let early in October.

Carthage, N. Y.—Village Board has just received specifications from City Engineer James P. Brownell for macadamizing of Budd St. from Church to Schools Sts., and job will be let in immediate future.

Depew, N. Y.—Street improvement bond issue of $166,000 will be voted on Oct. 12.

Newburgh, N. Y.—Bids will be received by J. B. Corwin, Mayor, at his office in City Hall until 12 o'clock noon, Sept. 19, for sale of $28,000 registered improvement bonds for purpose of raising money to defray cost of paving and permanently improving William St. from Broadway to Renwick St. by paving with Porter brick pavement, using stone curbing. Said bonds will be dated Nov. 1, 1914.

Rome, N. Y.—Bids for paving Bouck St. will be opened by Board of Public Works on Sept. 28, plans, specifications and estimates, as submitted by City Engineer J. L. Plunkett, having been approved. Estimate for paving Bouck St., from Whitesboro to Dominick St., with brick, totaled $8,543.85. For paving with asphalt or bitulithic it is estimated that cost will be $8,017.72.

Sayville, L. I., N. Y.—New highway will be opened connecting Lincoln Ave. and Macon St.

Theresa, N. Y.—Surveyors have been busy making another survey of village streets. New proposition is to come up to finish state road to curbing.

Greensboro, N. C.—Extension of paving on Lindsey St. is petitioned for.

Greensboro, N. C.—Bond issue of $100,000 for improvement of streets may shortly be sold.

Cincinnati, O.—An estimate of $15,954 for improvement of Deerfield Rd. has been approved, also estimate of $14,614 for improvement of Boudinot Ave., from Lick Run pike to Warsaw and Bridgetown Rd., and estimate of $7,900 for resurfacing of Sharon Ave. through Glendale.

Cincinnati, O.—Ordinances have been passed providing for improvement of various streets. Fred Schneller is Clerk.

Coshocton, O.—Resolutions have been passed providing for paving and sewer improvements to the amount of $19,011.50.

Coshocton, O.—Resolution has been passed for paving South 5th St. from Walnut to Pine. Estimate, $9,813.50. Ordinances have also been passed for issuing bonds for paving North 5th St. from Locust to Chestnut, for paving Hickory St. from Walnut to W. & L. E. yards.

Lima, O.—Lowest bidders for paving Metcalf St., from Vine St., were Tey & Mulligan, of Lima, or E. A. Freshwater, of Chester, W. Va.

Lima, O.—Resolution has been adopted for improving of State St., from Cole St. to Woodlawn Ave., by paving with either brick, asphalt macadam, asphalt block or sheet asphalt, upon foundation of 5-in. first class concrete, with necessary grading, curbing and guttering, etc.

Lorain, O.—Bids will be received by Director of Public Service until 12 noon, Sept. 29, for paving of Oberlin Ave. from 1st St. to N. Y. C. & St. L. Ry. with vitrified brick or asphalt block. Work consists of about 17,000 sq. yds. paving. C. M. Osborn is City Engineer. L. B. Johnston is Clerk.

Massillon, O.—Ordinances have been introduced by paving and grading committee, and passed, declaring it necessary to pave alleys in rear of postoffice with concrete.

Phillipsburg, O.—Bids will be received by Clarence Schreel, Village Clerk, until 12 noon, Oct. 10, for purchase of $2,500 bonds for improving streets.

Salem, O.—Money on bonds of Unity township improvement of Governor Cox Main Market Route No. 14, is now available, and work on this part of road can be commenced at once. Contract was let to McCarron Bros., of Youngstown.

Portland, Ore.—Bids have been received by Council for number of street improvements. Largest and most important of projects is for paving East 13th St. between Alberta St. and Killingsworth Ave. Oskar Huber's bid for asphaltic concrete of $17,799 was lowest.

Bordentown, Pa.—Mayor Gilbert, of Bordentown, has named committee to forward movement for improvements of Bordentown and Burlington Rd., cooperating with similar committees from other municipalities along the line.

Chester, Pa.—Preliminary steps have been taken toward repaving of 7th St. with plastic surface.

Chester, Pa.—Superintendent of Streets Joseph Messick has been authorized to advertise for bids for paving of about eight streets.

Meadville, Pa.—Bids will be asked for paving of South Cottage St. from Chestnut St. to Arch St.

Philadelphia, Pa.—Mayor Blankenburg in mesage sent to Councils urged that $50,000 be appropriated to Bureau of Highways, in order to permit re-employment of large number of men who have been laid off for lack of funds.

Philadelphia, Pa.—Contractors have submitted bids for country road and street work to Department of Public Works. The total value of all contracts is about $200,000. Classification includes grading, paving and repaving with asphalt, vitrified and wood blocks, and the repairing and patching of country roads with bituminous binder. Bulk of the work is to be performed on country roads. Low bidders will not be ascertained until schedule of all bidders, about 36 in number, is compiled.

Tionesta, Pa.—The Tionesta Borough Council has contracted with state highway department for construction of 1,050 ft. of brick paving, which will extend paving on Elm St. to Tionesta Creek bridge.

Wilkes-Barre, Pa.—Opening Grove St. from Stanton St. to city line will cost city $103,750, according to estimate submitted by City Engineer B. K. Finch, at meeting of council. His report was received and filed.

York, Pa.—General repairs to streets, gutters and crossings in North York are being planned.

Providence, R. I.—Resolution providing for widening of Angell St. from Governor St. to Wayland Sq. has been presented to Common Council by Councilman B. Thomas Potter of Second Ward, and then referred to committee on highways. Distance to be widened is about 1,500 ft.

Providence, R. I.—Bids for filling in and excavating at Field's Point and the wooden block paving of Prairie and Thurber's Aves. were opened by the Board of Contract and Supply. Excavating and filling at Field's Point: Bay State Dredging Co., 22 9-10 cts. sand, 35 cts. loam; Roy H. Beattie, 22 7-10 sand, 35 loam; Wilson & Englis Construction Co., 16 4-10 sand, 30 loam; O'Brien Construction Co., 19 7-8 sand, 60 loam; The Valley Co., 35 sand, 40 loam; Joseph McCormick, 19 1-2 sand, 19 1-4 loam; Borton Contraction Co., 47 1-8 sand, 47 1-2 loam; Seymour & Hunt, 44 sand, 44 loam; J. S. Packard Dredging Co., 24 sand, 60 loam; Winston & Co., 18 sand, 25 loam; Charles Crankshaw, 12 9-10 sand, 30 loam; R. H. Newell Co., and N. S. Brock, 23 sand, 23 loam; A. G. Tomasello, 22 1-2 sand, 40 loam; Antonio Aiello, 27 sand, 25 loam; Joseph McCabe, 23 sand, 45 loam; John Bristow, 43 sand, 43 loam. Wood block paving: Prairie Ave.—Franklin Contracting Co., Central Construction Co., United States Wood Preserving Co. Thurber's Ave.—Franklin Contracting Co., Central Construction Co., United States Wood Preserving Co.

Providence, R. I.—Mayor Daignault has approved resolution appropriating $28,000 for paving, curbing and building surface water drains in Pond St., from Clinton St. to East School St.

Woonsocket, R. I.—Resolutions have been adopted for improvement of various streets.

Sioux Falls, S. D.—Bids have been received by City Commissioners from three outside firms on paving of Summit Ave. and Ninth and Tenth Sts. with different materials. It is probable that contracts will be signed this fall in order to let successful bidder on different jobs start work early next spring. For paving of Summit Ave., between First St. and the Omaha right of way with asphaltic concrete following bids per square yard were received: Atkinson Construction Co., of Watertown, $1.59 per sq. yd.; Fielding & Shepley, of St. Paul, $1.58; the Ford Paving Co., of Cedar Rapids, $1.63. On Ninth St. work between Minnesota and West Aves., the bids were on three different materials, as follows: Sheet asphalt, Ford Co., $1.96; Atkinson, $1.86; Fielding & Shepley, $1.87; asphaltic concrete, Ford Co., $1.63; Atkinson Co., $1.61; Fielding & Shepley, $1.62; Portland cement concrete "A," Atkinson Co., $1.79; bitulithic, Atkinson Co., $2.31. Between Dakota and Covell Aves., on Tenth St., the bids of the three companies were also on different materials, as follows: Sheet asphalt, Ford Co., $1.96; Fielding & Shepley, $1.83; Atkinson Co., $1.86; asphaltic concrete, Ford Co., $1.63; Fielding & Shepley, $1.58; Atkinson Co., $1.61; bitulithic, Atkinson Co., $2.31; Portland cement concrete "A," Atkinson Co., $1.65.

El Paso, Tex.—County is planning to resurface road from Main St. to viaduct.

Mission, Tex.—Considerable street and sidewalk improvement will be made in near future.

San Antonio, Tex.—Bids to pave 31 streets, most of them short residential streets in Second Ward, on which bids have been received and rejected, were called for Sept. 28. Bidders were invited to offer bituminous macadam, plain water bound macadam, one and two-course concrete, and other pavements of reasonable cost for strictly residential streets, on all streets, and especially on all of them except Saunders St., Monterey St. and Houston St.

Grafton, W. Va.—Arrangements have been made to ask for bids at once for completion of section of street paving on West Main St. and construction of big retaining wall along south side of Latrobe St. from corner of freight station to point of junction of Latrobe St. to South Mary St.

Seattle, Wash.—Resolutions have been adopted for improvement of various streets.

Tacoma, Wash.—Public Works Commissioner Woods has advertised for bids for paving Puyallup Hill road within city limits. This road is paved already as far as Puyallup with exception of about a half mile strip inside corporate limits of Tacoma. Engineer's estimate of cost is $14,957. Pierce County will pay $8,000 towards cost, $2,500 will be assessed against abutting property and city will pay rest.

Janesville, Wis.—Oiling of county highways is being considered.

Superior, Wis.—Special bonds have been authorized for paving of L Ave. and Laurel Ave., from W. 7th St. to west side of Lot 7, Block 4, Gates' addition.

Superior, Wis.—Purchase of automobile street flusher is being considered.

CONTRACTS AWARDED.

Star City, Ark.—By Road Improvement Dist. No. 2 of Lincoln county to E. A. Hensley and John Perdue to build macadam road from Star City to Jefferson county line, about 28 miles, at cost of $108,000. Engineer is C. F. Moore of Pine Bluff.

Pasadena, Cal.—Andrew Holoway, whose bid was $22,388.90, has been awarded by City Commission contract for paving and curbing Pasadena Ave., from Colorado St. to Palmetto Drive. Other bid, put in by George R. Curtis, worked out at $23,782.21. Work will comprise 127,000 sq. ft. of paving and 123 lin. ft. of curbing. George Holloway, whose bid was $147.90, was warded contract to put in 1,700 sq. ft. of sidewalk on Ashtabula St., from Los Robles to Madison. Other bids were: J. E. Haddock, $165.75; Claude Rothrock, $151.30. George Holloway also was awarded contract for 13,500 sq. ft. of sidewalk on Palisade St., from Forest Ave. to Sheldon. His bid was $1,107. Other bidders were: Claude A. Rothrock, $1,107; Wm. Powell, $1,164.37; J. C. Kinsman, $1,215; J. E. Haddock, $1,282.50.

Sacramento, Cal.—Contracts aggregating $101,054.70 for construction of roads in Orange and Colusa county have been awarded by Advisory Board of State Engineering Department. Highway in Orange county, running from Irvine to Santa Ana, will be built by White & Gaskill of Long Beach, contract price being $37,935.50. Colusa county stretch between Berlin and Colusa Junction, amounting to $67,119.20, will be constructed by C. L. Shaad of Williams.

Hartford, Conn.—Report of Water Board awarding contract for road in Burlington district to Louis Longhi & Bro. of Torrington for $23,382.50 has been approved.

Washington, D. C.—By Commissioners, District of Columbia, to Cranford Paving Co., 2620 E St. N. W., to pave streets and avenues with asphalt.

Buckley, Ill.—For laying brick pavement, to H. C. Finley, Paxton, at $12,500.

Peoria, Ill.—To McElwee & Bushel, Peoria, at $10,734, for paving of Glen Oak Ave., 30 ft. wide, with brick, from Knoxville to State.

Prophetstown, Ill.—For paving work to Luther Wallingford of Steeling at $4,450.

Waukegan, Ill.—Board of Local Improvements has awarded contract for paving Washington St. to Western Construction Co., and Utica St. paving contract to Michael McCugo. In both instances contracts were awarded to lowest bidders. Bids on two improvements were submitted as follows: Utica St. job—Michael McCugo, $4,812.41; James Cape & Sons, $4,847.98; Western Construction Co., $4,917.78; Washington St. job—Western Construction Co., $40,470; Michael McCugo, $40,922.75; James Cape & Sons, $41,763.50; C. Peterson & Co., $41,949.75.

Elkhart, Ind.—By Board of Public Works to Rankeet & Eggleston of Mishawaka for paving of one block of Fulton St. with asphaltic concrete.

Fort Wayne, Ind.—The Grace Construction Co., Fort Wayne, will pave Home Ave. from Thompson to first alley west of Broadway with asphaltic concrete under private contract. Walks will be constructed on either side of street.

Richmond, Ind.—By County Commissioners of Randolph County for repairing Orlando Marshall road on county line to T. J. Connell at $5,023, including a bridge to cost $595. Road is about 1¼ miles in length.

Rochester, Ind.—By Comrs. of Fulton county for roads as follows: Two roads, J. J. Kelleher & Co., Frankfort, Ind., $21,336 and $9,284, respectively. One road, Wm. F. Smith & Co., Rensselaer, Ind., $35,100.

South Bend, Ind.—By Comrs. of St. Joseph county to Jacob Ackerman, La-Porte, Ind., at $174,675, for one concrete and two macadam roads.

Winamac, Ind.—By County Commissioners for building of Thompson gravel road in Tippecanoe township to Smith Alberding for $4,000. George Swrill, of Frankfort, received contract for construction of Weaver stone road for $10,200.

Winchester, Ind.—Contracts for construction of new road on Wayne Co. line, in southwestern part of county, and for construction of new bridge, have been awarded by County Commissioners. Bridge was awarded to Burk Construction Co., Newcastle, whose bid was $1,749, and road to T. J. Cornell, whose bid was $5,023.

Indianola, Ia.—For concrete paving to A. R. Lake, Indianola, at $1.20 per sq. yd.; curb, 35 cts. per lin. ft. W. H. Graves is City Clk.

Hazard, Ky.—For constructing macadam streets, to J. C. Codell, Winchester, at about $15,000.

Detroit, Mich.—For paving Military Ave. contract has been awarded to E. Porath & Son, Detroit, at $4,749; May Ave., to T. E. Currie, 20 McGraw Bldg., Detroit, at $5,599; Wilson Ave., to the Cleveland Trinidad Paving Co., 420 Lakeside Ave., Cleveland, at $7,213.

Grand Rapids, Mich.—For improving National Ave., to Hilding & Robie, at $16,194.

Kalamazoo, Mich.—To S. S. Saxton Co., Richmond, Ind., at 98 cts., for resurfacing of pavements to be laid out on East and West Vine Sts., Woodward Ave. and Patterson St.

Corinth, Miss.—To Baker & Coleman, Corinth, contract, at $50,000, for grading, bridging, piping and graveling highways for county.

Linneus, Mo.—For paving about 12,000 yds. with fiber brick, to Columbian Paving Co., Columbus, at $1.91 per yd.

Warrensburg, Mo.—To Geo. T. Menefee & Son, Sedalia, Mo., for 8,000 sq. yds. brick paving.

Paterson, N. J.—City Engineer Harder has reported following tabulation of bids and contracts were awarded to following: Grading, curbing and guttering, East 15th St., from 5th Ave. to Lyon St., Charles Claeys; Gray St., from Clay to Bond St., Charles Claeys; East 23d St., from 2d to 4th Ave., Andrew Cook & Co.

Roselle, N. J.—By streets and sidewalks committee, contract for 810 ft. of sidewalks in 6th Ave. to L. D. Francesco at 47 cts. per lin. ft.

Amsterdam, N. Y.—Forty-two bids for paving several streets of Amsterdam have been opened by Aldermen. J. Dimando & Co., New York City, or Mamaroneck, N. Y., received all contracts with exception of Shuler St., which went to P. Mulderny, of this city.

Granville, N. Y.—For paving with brick E. Main St. to John B. Dower, Ballston Spa., at $15,853.

Newburgh, N. Y.—City Council has reconsidered its resolution awarding contract to James L. Kehoe for paving of William St. and adopted in its place similar resolution making award of contract conditional upon success of city in floating bonds amounting to $28,000.

Bonds will be placed on sale in City Hall on Sept. 19.

Niagara Falls, N. Y.—To D. Catani, contract for construction of permanent walks on improved streets at bid of $13,000.

Saranac Lake, N. Y.—By Village Trustees, to Thomas McCormick, for 6-ft. walk on River St., at 18½ cts. per sq. ft.

Schenectady, N. Y.—Three paving contracts have been awarded by Board of Contract and Supply, and, on most important of trio, there was but one bid. Street in question is Eastern Ave. and only concern to bid was Schenectady Contracting Co., Schenectady. There were four bids submitted for paving work on Dobro Ave. and three on Ostrander Pl. In each case, Kehoe & Bisset were successful. The bids were as follows: Dobro Ave—T. R. Crane, $1,760; Schenectady Contracting Co., $1,803; Kehoe & Bissett, $1,525, and W. D. Goodale, $1,588. Ostrander Pl.—T. R. Crane, $3,288.50; Kehoe & Bissett, $2,385.90, and W. D. Goodale, $2,393.90. The details of Schenectady Contracting Co.'s bid on Eastern Ave. are as follows: Fifteen thousand lin. ft. of concrete curb at 50 cts., $7,500; 7,000 sq. yds. of stone-filled asphalt at $1.59, $27,030; 17,000 yds. five-year guarantee, 3 cts., $510; 1,000 ft. of 4-in. sewer laterals at 60 cts., $600; 1,000 ft. of ⅝-in. water laterals at 70 cts., $700, and 70 water taps at $7, $490. Total, $36,830.

Syracuse, N. Y.—To John Young, of Syracuse, at $26,675, for paving of Pond St., Lodi to Spring St.

Utica, N. Y.—N. D. Peters & Co. has been awarded contract for construction of several artificial stone sidewalks on various streets. Prices were 16 cts. for all except walk in front of Chamber of Commerce Bldg. on Elizabeth St., which will be constructed at cost of 50 cts. per sq. ft.

White Plains, N. Y.—To Peter Luciano contract for laying of sidewalks, curbs, gutters and relaying old sewer on Clinton St. His bid of $6,859.49 was accepted. He will use stone foundation for concrete walks and will use second hand brick, owned by village, for gutters.

Elyria, O.—By Board of Commissioners of Lorain county for improving Cotton and Town Line Rd. with slag base, asphalt top, to W. C. Traxler, Lorain, O., at $4,000, and Case Rd. and North Ridge Rd. with slag macadam, to Kennedy & Warner, Medina, O., at $7,000 and $35,000 respectively.

Lima, O.—Toy and Mulligan, Lima, have been awarded by County Commissioners contract for paving South Metcalf St. from Vine St. to plant of Gramm Motor Truck Co. Puritan brick was adopted for improvement. The Toy and Mulligan bid was $20,308. Offers of other bidders on same brick and quality were: H. C. Enck, Lima, $22,894; E. C. Freshwald, Chester, West Virginia, $21,705; A. L. Metheany, Lima, $23,920; Summers and Hardin, Lima, $24,963; Blodget and Mullen, Lima, $22,830; Hedges and Dye, Covington, Ky., $25,976, and Jameson and Blosser, Lima, $24,284.

Sebring, O.—For paving S. 15th St. with brick, concrete base, to Geo. B. Herring & Son, Mansfield, O., at $17,845.80.

Youngstown, O.—Following street paving contracts have been awarded: West Front St. repaving contract went to S. H. DeGroodt, 127 Woodland Ave., at $5,225.90, the Granite St. paving to P. Mylott at $2,283.20, the East Woodland and Poland Ave. paving to S. H. DeGroodt for $8,362.90, the Whitney Ave. paving to P. Mylott for $6,922, and the Belmont Ave. paving and sewer to James McCarron of Youngstown for $19,032.25.

Albany, Ore.—Council has let contracts for four additional blocks of pavement to Asphalt Machinery Co., of Seattle.

Bay City, Ore.—For 3,000 sq. yds. 2-course concrete pavement on 4th and C Sts. and 150 lin. ft. concrete curb and gutter, with foundation of crushed rock, clay fill, to Tillamook Bay Construction Co., Tillamook, at $36,007.

Berwick, Pa.—For paving Market St., from Front to Cemetery St., to John Heavener.

Butler, Pa.—Bids for construction of number of sidewalks have been opened and contract for such walks as had not been contracted for, awarded to Nick Kinnetti, whose bid was 11 cts. per sq. ft. for cement walks.

Connellsville, Pa.—Contract to pave Baldwin Ave., from Pittsburg to Prospect, and Ashman Ave., from end of present paving to city limits, has been awarded to Samuel Holmes & Co., of Mount Pleasant, whose bid was $11,191.85. Duggan & Miller bid $12,535.20.

Lewistown, Pa.—W. Howard Miller, cement sidewalk contractor, has been awarded contract for laying granolithic sidewalk and curbing along courthouse on North Main St. Bids were as follows: Curb—W. Howard Miller, 35 cts. per lin. ft.; S. P. Benfer, 35 cts.; Alfred Klinger, 35 cts.; C. A. Brown, 34 cts. Pavement—W. Howard Miller, 10 cts. per sq. yd.; S. P. Benfer, 11 cts.; Alfrink Klinger, 12 cts.; C. A. Brown, 10½ cts.

Pittsburgh, Pa.—Contract has been awarded by County Commissioners for improvement of 3.34 miles of Ingomar and Perrysville road to D. W. Challis & Sons, 420 Centennial St., Pittsburgh. Firm's bid was $69,539.30, lowest of eight. Work is to be done from Lowreys Run and Rochester road to Perrysville Plank Road. Macadam will be used.

Philadelphia, Pa.—Contracts for street work to value of $300,000 has been apportioned by Director Cooke. J. Joseph McHugh was awarded greatest amount, with total of $90,000. Union Paving Co., 30th & Locust Sts., with $56,621, and McNichol Paving & Construction Co., 1923 Cherry St., with $31,658. Both McNicol companies were close second.

Pittston, Pa.—For grading and surbing of Landon St., lowest bidder was Joseph Newcomb, at $1,675.60; for curbing and sewering portion of Winter St., to J. J. Mangan, at $381.25, and for grading and curbing of Vine St., to J. J. Mangan, at $1,590.25.

Union City, Pa.—For paving East and West High St., to Simpson & Metz, Erie, at $29,965.

Providence, R. I.—Contract for paving Prairie and Thurber's Aves. with wooden block paving has been awarded by Board of Contract and Supply to Franklin Contracting Co., 1 Hudson St., New York. Contract price for the work on Prairie Ave. will be $76,258.88, while that on Thurber's Ave. will be $21,808.80.

Spartanburg, S. C.—By Commissioners to Willard-Boggs Co. of Spartanburg for 4,500 sq. ft. of sidewalk at 91 cts. per sq. yd. and 8,500 ft. of gutter at 43 cts. per ft.

Sioux Falls, S. D.—Contract for paving of Summit Ave. from First St. to Omaha railway right of way has been awarded to C. H. Atkinson, Watertown, S. D., on his bid of $1.59 per sq. yd. for asphaltic concrete pavement, using Trinidad natural lake asphalt; all grading at 54 cts. per cu. yd.; concrete headers at 45 cts. per lin. ft. and 25 cts. per lin. ft. for 6-in. drain tile laid. Contract for paving of Ninth St. from Minnesota Ave. to West Ave. has been awarded to C. H. Atkinson on his bid of $1.61 per sq. yd. for asphaltic concrete pavement, using Trinidad natural lake asphalt; all grading at 55 cts. per cu. yd.; concrete headers at 45 cts. per lin. ft.; 6-in. drain tile laid at 25 cts. per lin. ft. and iron covers reset at $2 each.

Mineral Wells, Tex.—By City to General Construction Co. of Fort Worth to pave Oak St. with asphalt and to Bert Hahn Construction Co. of Dallas to pave Mesquite St. with asphalt, and to Whitley Construction Co. of Hillsboro to pave certain residential streets.

San Antonio, Tex.—By City Council contracts as follows: To Eureka Paving Co., River Ave., from Grayson to city limits, with 2-in. Bermudez asphaltic concrete at $1.94 per sq. yd., about 30,000 sq. yds.; also E. Commerce St., New Braunfels to Mittman, at $2.05 for 2-in. asphaltic concrete; total, $20,438; Standard Roofing Co., Chestnut St., Commerce to Austin St., 3-in., vertical fiber brick, $2.71; total $31,045; Medina St., Houston to Ruiz, 3-in. vertical fiber brick, $2.63; total, $32,160; Dakota St., Goliad to Cherry St., with 3-in. vertical fiber brick, $2.58; C. C. Chapin, Dakota St., from Cherry to New Braunfels St. with reinforced concrete with bituminous top at $1.75; Texas Bitulithic Co., Dallas, Ave. D., from 10th to Grayson St., with bitulithic, at $2.48; total, $3,560; Western Paving Co., Ruiz St., North Laredo to San Jacinto St. with asphaltic concrete with Bermudez, $2; total, $33,060; Uvalde Rock Asphalt Co., Martinez St., S. Alama to Garden St., 2½ in. Uvalde rock asphalt at $2.20; total, $3,520.

Centralia, Wash.—Lewis County Commissioners have entered into contract with Alfred & James, Centralia contractors, for clearing, grubbing and grading change of part of the Newaukum and Boistfort Rd. Contract price is $1,849.90.

New Glarus, Wis.—For paving 6,660 sq. yds. with reinforced concrete, to L. A. Larsen, 104 Main St., Oshkosh, Wis.

Niagara Falls, Ont.—Contract for construction of about ¾ of a mile of concrete sidewalks has been let to Ferris & Manley, at 12c. per sq. ft.

Winnipeg, Man.—For paving Academy Road, Kenaston Blvd., Basswood Pl., Greenwood Pl., St. John's and South Tuxedo Aves., Watt, Lenore, Lipton, Levis and Ruby Sts., to J. W. Astley, at following bids: $48,698, $14,267, $5,309, $7,358, $3,100, $12,470, $5,162, $9,899, $3,766 and $666.

SEWERAGE

Cucamonga, Cal.—Trustees of Cucamonga Storm Water Protection District have decided to expend $6,500 for reconstructing storm drain on Hellman Ave.

Holtville, Cal.—Sewer and bridge bond issue of $35,000 will be voted on Oct. 5.

Marysville, Cal.—Arrangements have been made between City Council and County Supervisors to carry city sewer system to County Hospital, distance of 2½ blocks.

Sacramento, Cal.—Assurance that big drainage pipe to connect canal south of Y St., which drains annexed district with new city sump, will be built in near future, has been given by Commissioner of Public Works Thomas Coulter.

New Britain, Conn.—Board of Public Works has been ordered to construct sewer in Millard St. when property owners sign quitclaim deed for street. Estimated cost of the work is $940. Construction of sewer in Rocky Hill Ave. at cost of $925 has also been ordered.

New Britain, Conn.—Board of Public Works has recommended that city meeting be called to authorize sale of $10,000 worth of sewer bonds or in lieu to borrow the money.

Stamford, Conn.—A report, plans, specifications and form of contract prepared by J. C. Harding, engineer, for sewage-disposal plant and public dock have been presented and referred to Health and Sewerage Committee and special committee appointed by Common Council to consider matter of sewage disposal. This sub-committee has been empowered to receive bids.

Willows, Cal.—A new sewer district will likely be formed in Willows, covering entire western section of city.

Jacksonville, Fla.—Bond issue for sewerage is being discussed.

New Smyrna, Fla.—Special election on question of voting bonds of $60,000 for installation of systems of sewer and water will be held in January.

Pablo Beach, Fla.—Bond issue of $35,000 for sewerage purposes has been favorably voted on.

Augusta, Ga.—Ordinance has been passed providing for construction and laying row of sewers on Stovall St. and on Emmett St.

Lafayette, Ga.—Election will be held for voting on $17,000 worth of bonds for sewerage improvements.

La Salle, Ill.—Only one bid has been received to date for $40,000 city sewer bonds, this coming from C. H. Kaufman, Chicago, who offers $40,041, but also asks $500 allowance for attorney fees, etc. Bid was rejected and city clerk ordered to readvertise for new bids.

Indianapolis, Ind.—Plans have been ordered for sewer, to cost $13,000, in first alley east of Meridian St., from Pleasant Run Blvd. to Raymond St.

Indianapolis, Ind.—Board of Works has ordered construction of local sewers in Alfree Ave. and in alley east of Sheldon St.

Mishawaka, Ind.—Number of catch basins will be installed on north side of city and in East end.

Richmond, Ind.—Engineer has estimated cost of sewer in Center St. from West Second to West Fifth St. at $4,868.

Burlington, Ia.—Resolution ordering construction of Louisa St. sewer and branches has been passed. New sewer is to be of vitrified pipe and will include large number of smaller branches.

Clinton, Ia.—Resolution has been adopted for construction of sewer on S. 4th St., from 7th to 10th Aves., and bids will be advertised for same.

Beverly, Mass.—Order appropriating $125 for short piece of sewer on Hale St. has been adopted and another providing for sewer on Lothrop St. to cost not more than $2,500.

Longmeadow, Mass.—Town meeting will be held at 8 p. m., Sept. 18, for vot-

ing on extension of sewer from north-end filter beds to Connectictu River, and for voting bonds in sum of $6,500 for same.

St. Paul, Minn.—Orders have been passed by Council for sewers on following streets: Blair St., from Farrington Ave. to Virginia Ave.; Blair St., from Fry St. to Snelling Ave.; Augusta St., from Goff to Robert St.; Capitol Blvd., from Cortland to Granite.

St. Joseph, Mo.—Ordinances have been adopted for construction. of various sewers.

East Orange, N. J.—Following are bids received for 4th Ave. and N. 19th St. drain—(a) G. P. Olcott & Son, Orange, N. J.; (b) Ziggs Construction Co., Newark, N. J.; (c) Joseph Befumo, newark, N. J.: 380 ft. 33-in. conc. pipe, per ft., (a) $3.25, (b)$4.05, (c) $3.50; 270 ft. 30-in. conc. pipe, per ft., (a) $2.96, (b) $3.80, (c) $3.25; 250 ft. 24-in. vitr. pipe, per ft., (a) $1.83, (b) $2.95, (c) $1.95; 320 ft. 18-in. vitr. pipe, per ft., (a) $1.02, (b) $2.55, (c) $1.25; 275 ft. 15-in. vitr. pipe, per ft., (a) $1.55, (b) $1.90, (c) $1.75; 430 ft. 12-in. vitr. pipe, per ft., (a) 80c., (b) $1.25, (c) 75c.; 265 ft. 8-in. vitr. pipe, per ft., (a) 65c., (b) $1.15, (c) 70c.; 8 manholes, each, (a) $40, (b) $45, (c) $45; 17 catch-basins, each, (a) $20, (b) $60, (c) $22.50. Total bid, (a) $442.60, (b) $6,863.25, (c) $4,826.75. Also for Eaton Pl. drain—(a) G. P. Olcott & Son, (b) Michael Stefanelli, Newark; (c) Joseph Befumo: 175 ft. 24-in. vitr. pipe, per ft., (a) $2.05, (b) $3.10, (c) $2.35; 525 ft. 18-in. vitr. pipe, per ft., (a) $1.55, (b) $2.85, (c) $1.70; 270 ft. 15-in. vitr. pipe, per ft., (a) $1.45, (b) $2.50, (c) $1.40; 105 ft. 12-in. vitr. pipe, per ft., (a) 80c., (b) $1.20, (c) 75c.; 5 manholes, each, (a) $42, (b) $50, (c) $48; 7 catch-basins, each, (a) $20, (b) $40, (c) $22.50. Total bids, (a) $1,998, (b) $3,369.75, (c) $2,258. Contracts have not yet been awarded.

New Brunswick, N. J.—City officials will take prompt steps to extend sewer system and Council has adopted resolution directing City Attorney to draw necessary papers at once, preparatory to awarding of contracts.

Passaic, N. J.—Ordinance has been passed for construction of sanitary sewer in Boulevard and Beech St. Sewer will be of vitrified pipe 8 inches in diameter. Z. A. Van Houten is City Clerk.

Passaic, N. J.—Boroughs of Haledon and Prospect Park have submitted to City Commissioners' request to be allowed to enter trunk sewer project.

Binghamton, N. Y.—Board has directed City Clerk to advertise for bids for construction of intercepting sewer in Chenango river along Wall St. These proposals will be opened on Oct. 7.

Binghamton, N. Y.—Board will direct City Clerk to advertise for proposals for construction of intercepting sewer along east bank of Chenango River on Wall St. This will be used to pick up sewers now emptying into Chenango and will, it is expected, materially purify stream from brush dam to the point.

Carthage, N. Y.—Specifications are out for surface water drain in West End Ave. to connect with piece laid from river across West End Ave.

Great Neck, L. I., N. Y.—Petition is being circulated for new sewers in Great Neck District.

Schenectady, N. Y.—Board of Estimate and Apportionment has affirmed action of Common Council in ordering sanitary sewers and water mains constructed on several streets.

Schenectady, N. Y.—All bids received for flood pumps and sewage disposal plant have been rejected, and secretary authorized to readvertise.

Utica, N. Y.—Bids for storm water sewer in City, Walnut and Knox Sts. and West Ave. have been received by Board of Contract and Supply. They were: Martin McManus, $3,179.54; John R. Baxter, Jr., $2,852.40; Domenick Pirritano, $3,-062.15; A. W. Fitch, $2,601.06; F. M. Johnston, $2,913.44, and Palmieri & Pepe, $3,-581.25. Proposals were referred to corporation counsel.

Coshocton, O.—Resolutions have been passed providing for sanitary sewer on South 5th St. from Mulberry to Pine and sewer on South 7th from Kenilworth south and for Boulevard sewers.

Coshocton, O.—Resolutions have been passed providing for sewer and paving improvements to amount of $19,011.50.

Massillon, O.—Ordinances have been introduced by sewer committee and passed, declaring it necessary to construct sanitary sewers on Madison, North Waechter and McLain Sts.

Niles, O.—Resolution has been adopted for construction of storm sewer in sewer district No. 1.

Springfield, O.—Work will be started by city engineering department the first of next week on plans for new high level sewer which city will lay in central business sections this coming winter.

Edwardsville, Pa.—Permit has been issued for lateral sewer extensions.

Greenville, Pa.—Preliminary treatment tanks with disinfection apparatus will be installed.

Montrose, Pa.—Permit has been issued for lateral sewer extensions, preliminary treatment tanks and disinfection apparatus.

Philadelphia, Pa.—Permit has been issued for lateral sewer extensions.

Beaver, Pa.—Alternate plans for sewage disposal plant of Beaver Falls have passed engineering corps of State Department of Health and are now up to Commissioner Samuel G. Dixon for signature, and it is expected that city will know in short time what disposition will be made.

Bethlehem, Pa.—Boro. Council has accepted offer of Kurtz Bros. and have practically agreed to build sewer between 4th and 5th Aves., Bethlehem, West Side. Sewer is to be built at approximate cost of $4,500-$5,000. Kurtz Bros. will pay $300 of cost, or slightly more than first year's interest.

Connellsville, Pa.—Erection of sewage disposal plant is ordered by Health Commissioner. Estimated cost $300,000.

Parsons, Pa.—Arrangements may be made whereby Borough of Parsons will be permitted to connect its sewer system with system of this city in consideration of yearly rental to be agreed upon.

Philadelphia, Pa.—Sum of $200,000 has been granted for construction of improved sewer from Fourth to Twelfth St.

Williamsport, Pa.—Ordinance has been passed providing for sewer inlet at W. 4th & Bergen Sts.

Pawtucket, R. I.—Resolution has been adopted appropriating $6,000 for construction of sewer in Columbia Ave.

Providence, R. I.—Following are bids received for new pump: Turbine driven engine for Ernest St. sewerage pumping station—Providence Engineering Wks., Alberger Pump & Condenser Co., Harry L. Bond Co., Boston; Schumacher-Santing Co., Boston; Allen-Chalmers Manufacturing Co., Power Equipment Co., Henry R. Worthington.

Dallas, Tex.—Sewer bonds in sum of $50,000 may be sold shortly.

Tacoma, Wash.—Tacoma has been asked to build storm sewer through bottom of Canyon behind new Lincoln Park High School.

Superior, Wis.—City Commission is making preliminary arrangements for extensive improvements to K St. sewer, in Second Ward.

Superior, Wis.—City Clerk R. E. McKeague has advertised for sale issue of $23,500 of general bonds of city of Superior, proceeds of which will be used to pay city's share of cost of new sewers under construction at Billings Park and Allouez. Bids for bonds will be opened on Sept. 21.

Niagara Falls, Ont.—City Council has decided to call for bids on work of constructing sewer extensions in Bampfield, Barker, Jose, Delaware and Stewart Sts. Estimate is $5,500.

CONTRACTS AWARDED.

Argenta, Ark.—To Gass & Horton of Houston, Tex., at $275,244.50 to construct storm and sanitary sewer system in Sewer Improvement Dist. No. 1. Work consists of about 17 miles tile sewers and 3 miles reinforced concrete sewers. Engineers are Lund & Hill of Little Rock.

San Francisco, Cal.—For making sewer improvements in Civic Center, by Board of Public Works to Church & Clark, at $12,000.

East Hartford, Conn.—For construction of sewers, contracts have been awarded to Prospero Bonadies & Co. at bid of $6,788.40.

Chicago, Ill.—By Board of Local Improvement, for construction of public drains in various streets, to Tiritilli & Till, Daniel Hardin, 3139 Indiana Ave., Angelo Santucci, 708 Gilpin Pl., Theodore Di Vito, and Louis Scully, 924 Taylor St.

Iowa City, Ia.—Contracts for storm sewers have been awarded to J. L. Berry and W. Hotz, of Iowa City.

Salina, Kan.—For construction of certain sewers, to D. G. Stock, of Salina, at bid of $3,765.

Bay City, Mich.—For constructing sewers in Sidney and Marquette Aves., to Cox & Co., at $9,800. E. E. Prohazka is City Comptroller.

Brainerd, Minn.—To Ilstrup & Olson, Minneapolis, for district sewer No. 3, at $3.80 per lin. ft. Other bidders were: F. A. Glass, city, at $4.20, and Pastoret Construction Co., Duluth, at $4.08 per lin. ft. Contract has been awarded to F. A. Glass, city, for lateral A-4 sewer at $1.65 per lin. ft.

Bayonne, N. J.—By council, contract for reconstruction of Ave. F sewer, to Frank B. Eddy, of the Ten Broeck-Eddy Co., of Bayonne. Mr. Eddy offered to reconstruct sewer for cost of work plus 8%.

New Brunswick, N. J.—Contracts for construction of sewer on Welton St., between Remsen and Throop Ave., and on Carman St., from Welton to Burnet Sts., have been awarded to Patrick J. Moran.

Paterson, N. J.—Contracts for sewers have been awarded to following lowest bidders: Murray Ave., from lot 96 to lot 102, Joseph Puglia of Paterson; 10th Ave., from East 26th to East 27th St., Joseph Puglia; Amity St., from East Main St. to Passaic river, Buffalo Ave., from Main to Paxton Sts., Frank Puglia; North 2d St., from Haledon Ave. to Jefferson St., Joseph Puglia.

Binghamton, N. Y.—By Board of Contract and Supply contract for construction of Sixth Ward intercepting sewer to B. L. Gabriel for $14,165.11.

Cleveland, O.—By Bd. Control contracts as follows: Fred R. Jones Co., for construction of drain for filtration plant, just south of clear water reservoir, at $15,551; to Amata Constr. Co., 1108 Engineers Bldg., sewer on School Ave., N. E., Whitcomb Rd., N. E., $22,018; J. Connelly Constr. Co., Coit Rd., N. E., with outlet to Nine Mile Creek, $22,608, and same contractor, E. 152d St., Sect. 2, at $52,929.

Springfield, O.—Contractor Phillip Hounker is low bidder on sewage disposal plant for tuberculosis hospital at $1,508.75. Work includes erection of sewage disposal plant and all sewer mains from principal buildings. About 1,000 ft. of piping will be required.

Youngstown, O.—Contracts aggregating $160,000 for sewer and street paving work have been awarded by Board of Control. Biggest contracts were for district sewers which will drain large part of newly annexed township territory, and give former township residents opportunity to have city sanitary sewers. Charles Harris, Youngstown, will build Steelton district sewer No. 1 at a cost of $47,260. The Mahoning Ave. district sewer goes to Andy Trupo at $32,994.77. A. O'Horo landed Steelton sewer No. 2 at $14,437.20, while No. 3 district sewer was awarded to Ed Conricote at $11,010. The last named contractor will also build the Berlin St. sewer to cost $1,632.61.

Dallas, Ore.—For constructing septic tank in connection with sewage treatment plant, to Berham Bros., at $5,500.

Monroe, Ore.—By City Council to C. M. Swartely, of Cordvallis, for building main sewer. Vitrified pipe is to be used.

North Wales, Pa.—By Borough Council for constructing system of sewers, sewage disposal plant and house connections from plans of Remington & Vosburg, 601 Market St., Camden, N. J., to Cantrell Construction Co., Real Estate Trust Building, Philadelphia, at $49,-984. Totals of other bids: Suburban Contracting Co., Philadelphia, $64,725; Keeley McFeeley Co., Camden, N. J., $71.525; Edw. L. Bader, Atlantic City, N. J., $140,292. Ralph Schafenscker is Clk. of Council.

Williamsport, Pa.—Contract for house sewer in W. 3d St., Newberry, has been awarded to Joseph McCadden, at his bid of $849.76, and to Charles Dugan, contract for house sewer in Poplar St., at price of $352.91.

Aberdeen, S. D.—To L. W. Schruth, Fargo, N. D., at $46,511, for about 13,250 ft. storm sewers, 39 manholes and 45 catch basins. F. W. Raymond is City Auditor.

Sioux Falls, S. D.—Contract for construction of sewer connections on Summit Ave. from First St. to right of way of the Omaha railroad has been awarded to Myrmo Bros., Sioux Falls.

Laredo, Tex.—By City to A. Deutz & Bro., Laredo, to construct 24 and 30-in. storm sewers at cost of $24,000. E. J. Foster is engineer in charge.

Charleston, W. Va.—By Board of Affairs to Jas. Ferry & Sons, Pittsburgh, Pa., and Baltimore, Md., to construct Sections 1, 2 and 4 of sewer system at cost of $110,000; to C. M. Scanlon Construction Co. of Huntington, W. Va., at

$27,200 for Section 3. Work consists of about 9 miles sewers, ranging from 72 to 8 inches in diameter, with manholes, catch-basins, etc.

Huntington, W. Va.—For constructing storm trunk sewer in 4th Ward, to Sluss-Baker Construction Co., at $75,500. A. B. Maupin is City Engineer.

Fond du Lac, Wis.—For sewers as follows: Waukesha Sewer Construction Co., Waukesha, 2,500 ft. 8 to 15-in. pipe in Arndt Ave., and to A. C. Schroeder, Manitowoc, for 5,000 ft. in Western Ave.

New Westminster, B. C.—To R. McLean & Co., Pacific Bldg., Vancouver, for constructing Sapperton sewer system at $76,312.

WATER SUPPLY

Ozark, Ala.—Waterworks bonds in sum of $25,000 have been sold to Steiner Brothers, Birmingham. Funds will be used to increase and enlarge present waterworks plant.

Berkeley, Cal.—Pursuant to campaign of several years on part of residents in southern section of Berkeley, People's Water Co. has begun construction of several larger water mains in South Berkeley. Mains, which are 16 and 24 ins. in diameter, are, according to officials of corporation, sufficient to insure ample water for fire protection.

Chico, Cal.—Plans for new independent water system for Chico State Normal School have been changed. Instead of tower and gravity pressure, an underground tank with constant Holly pressure will be installed.

Garden Grove, Cal.—Citizens are discussing new domestic water plant.

Santa Ana, Cal.—Specifications for pump and boiler for water works have been adopted, and Oct. 5 set as time for opening bids.

San Francisco, Cal.—Bids will be asked for boring another well in block bounded by 44th and 45th Aves. and Fulton and Cabrillo Sts.

San Francisco, Cal.—Request has been made to Supervisors for $2,500 more for drilling test holes, first appropriation of $2,500 being spent. Test holes are made to determine the best locations for wells in Richmond and Sunset.

Stockton, Cal.—Six-in. and 4-in hydrants are to be installed in Homestead, North Stockton and Fair Oak additions.

Hartford, Conn.—Water Board has opened bids for supply of meters for season, but award of contract was deferred. Bids called for 625 meters, made up as follows: 250 ⅝-inch meters; 300 ¾-inch meters and 75 1-inch meters. Bidders were: Henry D. Worthington, Hersey Mfg. Co., South Boston, Mass.; Pittsburgh Meter Co., E. Pittsburgh, Pa.; Union Water Meter Company, Worcester, Mass.; Neptune Meter Co., 90 West St., New York City, and Thomson Meter Co., 100 Bridge St., Brooklyn, N. Y.

Waterbury, Conn.—Contract has been awarded to Engineer Charles H. Preston, Jr., of Waterbury to make surveys, maps, borings, soundings, etc., and report on feasibility of water conservation throughout Naugatuck Valley.

Washington, D. C.—An American consular officer in Canada reports that firm in his district desires to be put in touch with American manufacturers of or dealers in steel water pipes or tubes, with view to representation. Firm handles water pipe principally for municipal and government work. No. 13,618, Bureau of Manufactures.

New Smyrna, Fla.—Special election on question of voting bonds for $60,000 for installation of systems of water and sewers and paying up indebtedness of city of New Smyrna will be held early in January, if present plans of City Council are carried out.

Newton, Kan.—City Commission has accepted offer of Harris Trust & Savings Bank of Chicago to sell block of $5,000 of city water works bonds due in 1931 at 106.

Fall River, Mass.—Plans and specifications for auxiliary pumping station upon which bids opened recently were based, will be altered under direction of Prof. Miller and Prof. Barrows in order that this work may be done within amount prescribed by commission.

Longmeadow, Mass.—Town meeting will be held at 8 p. m., Sept. 18, for voting on extension of water main on Benedict terrace, from Llewellyn St. to Laurel St.

Salem, Mass.—City Directors have awarded the $40,000 water loan to Salem Savings Bank for $40,276.

Saugus, Mass.—Water Commissioners are legally asking for authority to borrow $35,000 for extending and improving water system of town.

St. Paul, Minn.—Mains have teen ordered laid by Water Board. On Prior Ave. a 12-in. main will be laid for 150 ft. from Charles St. Six-inch mains will be laid as follows: Thomas St., from Oxford St. to Lexington Ave.; Gotzian St., from 4th to Siegel St.; Princeton Ave., from Cleveland to Prior Ave.; Hamline Ave., from Osceola to St. Clair St.; Stinson St., from Oxford St. to Lexington Ave.

Duluth, Minn.—Residents of western part of hillside in West End will ask for extension of water system to their locality this coming fall in hope of getting improvement next spring.

Atlantic City, N. J.—Bids received for construction of concrete retaining cistern and other improvements to water supply region at Doughty's Pond have been rejected and new bids will be advertised for.

Atlantic City, N. J.—City Commissioners will readvertise for new bids for construction of mammoth cistern at Absecon water shed.

Perth Amboy, N. J.—Board of Water Commissioners has decided to borrow $20,000 at 6% for three months, to lay eight 6-in. water mains in streets for which petitions have been made.

West Orange, N. J.—New water supply system is being discussed.

Lestershire, N. Y.—Board of Trustees of Village of Lestershire will receive bids at Council Chamber in Municipal Building until 8 p. m., 5th day of October, for sale of bonds in amount of $10,000 for purpose of enlarging and improving pumping system at its water works on Broad St. W. C. Lewis is Village Clerk.

Remsen, N. Y.—Installation of water system is being planned.

Schenectady, N. Y.—See "Sewerage."

Camden, O.—Question of municipal water works and electric light plant for town of Camden will be submitted to voters of that village at coming election, November 3.

Cincinnati, O.—Estimate of $21,122 for repair of Duckcreek road, from N. & W. Railroad to Deerfield road has been approved, and plans and specifications ordered. Estimate of $22,569.74 for improvement of Hunt road, from Blue Ash to Reading has been referred for visitation by board.

Cleveland, O.—Water Department needs confronting city will cost $5,000,000. Public Utilities Director C. W. Stage has submitted report to city department heads to consider bond situation. Statement prepared for Director Stage by C. F. Schulz, Commissioner of the Water Division, shows $3,500,000 water bonds must be sold in near future to care for needed water department improvements. It was decided that council would be asked to authorize immediate issue of $1,000,000 bonds for water works purposes.

Dayton, O.—Bonds to amount of $250,000 will probably be authorized by ordinance by City Commission, preparatory to extending water works system. This, as explained by Service Director Barlow, will be sufficient to penetrate heart of Dayton View, west side of South Park. Tributary mains will have to be constructed by funds obtained from additional bond issue.

Biglerville, Pa.—Water Co. has obtained permit to install gravity supply line and storage reservoir.

Eldred, Pa.—Permit has been issued for drilled well and force main.

Grove City, Pa.—Permit has been issued for drilled wells and extensions to distributing system.

Mont Alto, Pa.—Storage reservoirs, gravity supply line and distributing system will be installed.

Punxsutawney, Pa.—City Council has secured options on water supply that is regarded as sufficient for city three times size of Punxsutawney, and which is situated a short distance from borough limits, and all other necessary preliminaries to assured establishment of municipal water plant has been accomplished. Cost is estimated at $125,000. Plans of Council as relates to establishment of plant are complete. A dam, cost of which will be but comparatively slight, owing to the lie of the ground, is to be constructed about one-half mile below flowing wells. This dam will be nearly 300 ft. in width and 20 ft. high at the breast, with a capacity of 100,000,000 gals. Supply here is to be used only as reserve supply, as water from streams above wells and from wells themselves is considerably more than adequate for the town's needs. Pumping station will be located about midway between dam and wells, and water from wells and dam (when necessary) will be pumped about three-fourths of a mile north of wells to top of hill, where huge reservoir is to be constructed and for which land has been leased. Bed of lowest run level at dam site has elevation of 1,290 ft. To wells, with their elevation of 1,347 ft., is rise of 17 ft. Reservoir will have elevation of 1,532 ft., so that water will have to be pumped up about 232 ft.

Shippensburg, Pa.—Permit has been issued for gravity supply line and storage reservoir.

Spring City, Pa.—Permit has been issued for water works system for Eastern Pennsylvania State Institution for Feeble Minded. Supply is to be obtained from drilled wells.

Sykesville, Pa.—Permit has been issued for drilled wells and distributing system.

Sioux Falls, S. D.—Bond issue of $135,000 for additional water works improvements is being considered.

Corpus Christi, Tex.—Council has passed resolution instructing City Engineer Stevens to proceed at once with preparing plans for water works improvements. Engineer Stevens advised that it would require from four to six weeks to complete this work.

Ogden, Utah.—Artesian wells as source of water supply for Ogden City are being considered by Commissioners, who have sent in water from wells driven at Huntsville for analysis.

Lynchburg, Va.—Resolution providing for appropriation of sum of $2,800 for extension of water main in Elm Ave., between 17th and 19th Sts., has been concurred in.

Lynchburg, Va.—City Engineer Harry L. Shaner and surveying party will make survey for installation of an aerating plant for city water. This survey is one of last phases of proposed auxiliary water system, and when survey is made report will be ready for the City Council.

Ralston, Wyo.—Engineers engaged by Town Council of Powell have completed their surveys, preliminary plans and estimates of cost of water works for that town, and election is ordered September 23 to decide whether people want to issue $61,500 bonds to cover cost of water works. Plans provide for gravity system from Ralston reservoir. This reservoir is located about seven miles southwest of Powell and is about 250 ft. higher than Powell.

CONTRACTS AWARDED.

San Francisco, Cal.—Contract for drilling well in Richmond district has been awarded to S. M. Halstead for $2,600.

Chicago, Ill.—By Board of Local Improvements, for laying of water service pipes in various streets, to James J. Renn, 3820 Herndon St., Washington Plumbing & Heating Co., David Walsh, 6828 S. Chicago Ave., and David Hardin, 3139 Indiana Ave.

Wellington, Kan.—N. S. Sherman, of Sherman Machine & Iron Works, an Oklahoma City concern, has been awarded contract to construct and install 15 miles of 18-in. pipe line for city of Wellington, Kan., the consideration being $125,000. The 18-in. pipe line to be furnished by Sherman Co. will be part of new water works system that is being installed by Wellington.

Gardiner, Me.—For constructing a covered slow sand filtration plant, to Young & Hyde, Produce Exchange, New York, N. Y., at $48,634.

Portland, Me.—By Trustees of Portland Water Dist. for pipe for proposed new main to reinforce supply for Morrill's Corner section of Ward 9, to R. D. Wood & Co., 400 Chestnut St., Philadelphia, Pa., at $20.30 per ton; total cost, about $25,000.

Clinton, Mass.—At meeting of Water Commissioners Board awarded contract for construction of new dam at Heywood basin at Wekepeke to R. H. Newell and N. S. Brock of Uxbridge, the lowest bidders. Their bid was $17,122.50. There were 10 bidders, other figures being as follows: Clinton Concrete Co., $17,978.67; Murphy & Hennessy, $18,599.58; G. Rossi & Son, Leominster, $18,675.15; Thomas A. Cassidy, Fitchburg, $19,803.10; Light, Heat & Power Corp., Boston, $20,841.53; Ryan & Keon, Boston, $21,250; Walter L. Mellen, Worcester, $23,034.41; Hancock Engineering Co., $24,928.30; King Contracting Co., Boston, $28,207.04. Work to be done consists of construction of earth dam with core wall of reinforced concrete, a spillway with concrete side walls, and a concrete paved bottom, a concrete gate-house and scren chamber containing two 18-inch gate valves and one 36-inch gate value and screens of copper wire mesh laying and embed-

ding in concrete, one 18-inch and one 36-inch outlet pipe, and the construction channels for conveying water from the spillway and from the discharge pipes. Dam is to contain central wall of concrete, 12 inches in thickness, reinforced by one-half inch round steel rods spaced one foot apart in both directions, this wall resting upon a foundation of plain concrete two feet thick.

Lowell, Mass.—Water Department has opened bids for contract for all work to be done on new filtration plant with exception of excavation and contract awarded to lowest bidder, Charles R. Dowd, of Boston, whose bid was $91,-313.75. Other bidders and their bids were as follows: Conners Bros., $113,-947; Bruno & Petti, $120,000; William Pike, $150,805; D. H. Walker, $102,221.50.

Ann Arbor, Mich.—For construction of steel intake crib & concrete shore well for villages of Highland Park and Grosse Pointe Farms, to John Baer, Port Huron, Mich. Following is bid of successful bidder: 270 lin. ft. trenching, at $7.24; 2,500 lin. ft. dredging, at $2.00; 275 lin. ft. furnishing and laying 36-in. c.-i. pipe and special castings in shore section, at $7.22; laying 2,500 lin. ft. 36-in. c.-i. pipe in Lake section, at $12.08; 270 lin. ft. backfilling in shore section, at $2.22; 2,500 lin. ft. covering in Lake section, at 58c.; furnishing and placing steel intake crib at sum of $2,634; 440 cu. yds. excavating for shore well, at $3.68; taking care of water, at lump sum of $360; 125 cu. yds. concrete, at $10.80; 90 cwt. reinforcing, at $3.60; 132 cwt. cast iron pipe and specials, at $3; 36-in. gate valves for lump sum of $500; 45 lin. ft. 8-in. w.-i. pipe and fittings, at $2; 45 lin. ft. 4-in. w.-i. pipe and fittings, at 50c.; 32 cwt. structural steel, at $7; premium on bond, $500. Total bids, $49,-259.40. Other bids were: M. Rabbitt & Sons Co., Toledo, O., $74,376; Cullen-Friestedt Co., Chicago, Ill., $71,759.86; T. L. Durocher, Sault Ste. Marie, Mich., $65,967.99; Edward Grey, Detroit, Mich., $63,355.19; Muskegon Dock Dredging Co., Muskegon, Mich., $61,903.50; A. Q. Thacher Cont. Co., Toledo, O., $52,472.75; Great Lakes Dredging & Dock Co., Chicago, Ill., $49,000; Shirley-Skeldon Dld. & Sub-Mac. Constn. Co., Toledo, O.; Nash Dowdle Co., Chicago, and J. T. Walbridge Engr. Co., Chicago and Detroit. G. S. Williams, Ann Arbor, Mich., is Consulting Engr., and R. K. Holland is Principal Asst. Engr.

Bancroft, Mich.—By town, to Grand Rapids Hydraulic Co., Grand Rapids, Mich., for installation of complete water system.

Good Thunder, Minn.—To W. C. Frazer, St. Paul, Minn., for extension of water mains at $1,745.

Rochester, N. Y.—Work on building of movable dam in Genesee River, at Central Ave., will begin shortly. The T. A. Gillespie Co., 90 West St., New York City, has contract and is making preparations to begin work right away.

Wahpeton, N. D.—To Tanner Bros., St. Paul, Minn., for 1,000,000 gallon filter plant at $21,000. Wm. Danforth, St. Paul, Minn., submitted bid of $22,300. L. P. Wolff is Engineer.

Mitchell, S. D.—For constructing reinforced concrete reservoir, 750,000 gals. capacity, to Ward & Weighton, Sioux City, Ia., at $9,390. Thos. Eastcott is City Auditor.

Parker, S. D.—Contract for water works plant has been awarded to Stanley Edmunds, of Yonkton, at $5,050.

Parker, S. D.—To Stanley Edmunds of Yankton, S. D., for municipal water works system, at $5,053.

Sioux Falls, S. D.—Contract for construction of water connections on Summit Ave., from First St. to right of way of the Omaha railway, has been awarded to Myrmo Bros., Sioux Falls.

Toppenish, Wash.—For addition to municipal water works, including erecting tank, 75,000-gal. capacity, at height of 105 ft., and laying 15,000 ft. c. i. pipe to C. H. Green Co., Spokane, at $28,421. C. A. Wyckoff is City Clerk.

Grand Rapids, Wis.—To John Corbett, of Bancroft, Wis., for ditches and enlarging present ditches at $7.19 per cu. yd.; Ewing & Brockenbough, Lafayette, La., $7.98 per cu. yd.; Arpin Cranberry Co., Grand Rapids, Wis., $9.25 per cu. yd.; Gilmore Bros., Toledo, O., $8.50; Marbough Bros., Montaray, Ind., $9.95 per cu. yd.

Madison, Wis.—To T. H. Iglehart, 209 S. LaSalle St., Chicago, for laying water mains in Fair Oaks district, at $3,000.

North Milwaukee, Wis.—To Chas. A. Sauer & Son, city, for filter bed.

LIGHTING AND POWER

Fort Smith Ark.—Estimates of equipment and cost of municipal light plant that City Commissioners have been considering installing in connection with water plant, have been completed and filed with City Clerk. Total cost is given as $209,677.10, and of this $40,000, in round numbers, is for poles, anchors, etc., for stringing of wires and mounting of lamps. Additions to building that will be needed to install electrical equipment is given as $4,780, and cost of generating plant is $15,570. Estimates are made on basis of streets being lighted with 160 lamps on ornamental posts and 400 lamps suspended over the streets in present manner.

North Sacramento, Cal.—Establishment of street lighting district in this district is being discussed.

Richmond, Cal.—Additional street lights for downtown district will be petitioned for.

Washington, D. C.—An American consul in Norway reports that large wholesale house in Europe wishes to purchase wire bulbs for electric lamps (Edison system), also vulcanized cables for installations. No. 13734, Bureau of Manufactures.

Jacksonville, Fla.—Electrical Superintendent W. H. Tucker is about to ask Board of Bond Trustees for 5,000-kilowatt engine for lighting plant. Engine for which requisition is to be made will cost about $60,000 and must be built after it is ordered. To build it will take about a year.

Pablo Beach, Fla.—Bond issue of $10,-000 has been voted for electric light plant.

Elmwood, Ill.—Plans are being made for municipal electric plant by Engineer L. W. Lemon, of Clinton.

Waukegan, Ill.—Bids will be received by the Electric Light Committee at 107 Washington St. until 8 p. m., Sept. 24, for complete installation of ornamental lighting system of 148 posts. Plans and specifications may be obtained from Mayor J. F. Bidinger. M. J. Douthitt is City Engineer.

Cambridge City, Ind.—Matter of further improvement of electric lighting system on Main St. from points east and west of cluster lights to corporation limits is now under consideration. Idea is to remove arc lamps and use large incandescent lights in their place.

Fort Wayne, Ind.—Board has ordered additional arc lights installed in various places.

Martinsville, Ind.—City Council has sold bonds in sum of $10,000 to E. M. Campbell & Sons Co., of Indianapolis. Bonds were sold to obtain money for extensions of city street lighting system.

Muncie, Ind.—Boulevard lighting system is being favorably considered by Muncie Commercial Club.

Richmond, Ind.—Petition for installation of ornamental lighting system, wires to be placed in conduits, for business section of Main St. and north end business district, has been presented to Board of Public Works. Board has ordered resolution to be prepared. Petition asks for ornamental lighting system on Main St. from the bridge to 13th St.; on Eighth St. from Main to North and South A Sts. and from D St. to E. St.; on Fort Wayne Ave. from Seventh St. to Eighth St. and on North E. St. from Eighth St. to Tenth St.

Leavenworth, Kan.—"White Way" plans have been approved by Commissioners.

New Orleans, La.—Plans are being considered by merchants of Camp St. for installation of ornamental lamps on Camp St., from Canal St. to Howard Ave.

Beverly, Mass.—An order providing for location of conduits on Rantoul St. for installation of underground connection for 16 luminous arc lights on Rantoul St., thus making a second "White Way" in city, has been adopted by Board of Aldermen.

Fenton, Mich.—Plans are under consideration for installation of ornamental lighting system.

Morrice, Mich.—New electric light franchise has been voted on.

Duluth, Minn.—Ordinance making appropriation for West Duluth unit of electric lighting plant to compete with Duluth-Edison Electric Co. has been introduced by Commissioner Leonidas Merritt, head of division of public utilities. Ordinance calls for appropriation of $85,-800 and recites in some detail purposes for which money is intended; namely, construction and equipment of plant at West Duluth to furnish electric light to part of city between 38th Ave. west and 73d Ave. west.

Smithville, Mo.—Proposition to provide this city with street lights, which was defeated at recent special election, will be voted on again Sept. 29, as another special election has been called.

St. Louis, Mo.—West End Business Men's Association is considering plans for illumination of Franklin Ave. from 12th St. to Beaumont.

Blair, Neb.—Electric light bonds in sum of $35,000 will be voted on Sept. 29.

Atlantic City, N. J.—Ornamental diverting standards will be erected by city at the intersection of Atlantic and Albany Aves. and also at intersection of Ventnor and Albany Aves.

Butler, N. J.—Bids exceeding by $6,-000 to $8,000 the $30,000 appropriated by borough for installation of electric lighting system have been received by Mayor and Borough Council. Bids are in three sections—power-house, transformer and machinery and poles and wire. Estimate of cost of installing plant adequate to needs of the borough was $24,000. It was agreed, however, that margin of $6,000 should be allowed in making appropriation.

Perth Amboy, N. J.—Board of Aldermen has approved of resolution providing for submitting proposal to establish municipal electric light plant to voters at next general election.

Trenton, N. J.—A proposition to give this city a "great white way" that will compare favorably with those of other large cities is to have support of Chamber of Commerce. It is desire to have centre of city brilliantly illuminated. Plans are being considered.

East Rockaway, L. I., N. Y.—Trustees of this village have signed contract with Queensborough Gas & Electric Co. to install 117 40-watt Tungsten incandescent lights in streets of village. Cost will be about $19.15 for each light.

Freeport, L. I., N. Y.—Plans for municipal gas plant for village is being considered.

Dayton, O.—Ordinance asking that bond issue in sum of $500,000 be submitted to people at next election for their sanction, for purpose of constructing a municipal electric light plant for Dayton, is being discussed.

Dayton, O.—Additional lights in Vernon Pl. have been asked for.

Hamilton, O.—Ordinance has been passed authorizing isue of $11,000 of 5 per cent. ten-year bonds for purpose of improving gas department by purchase of pipe for extension of mains.

Woonsocket, R. I.—Resolution appropriating sum of $650 and adding same to appropriation for street lighting has been passed.

Branchville, S. C.—Bond issue in sum of $10,000 for electric lights will be voted on Sept. 22.

Cathlamet, Wash.—Installation of municipal electric light plant in Cathlamet is being considered.

CONTRACTS AWARDED.

San Francisco, Cal.—Plans for beautification of 4th St., from Market to Townsend, have been advanced when Fourth and Fifth Street Improvement Club opened bids for 95 electroliers. Contract was awarded to the California Electrolier Co.

Bloomington, Ill.—Contractor Guy Carlton is awarded contract to furnish incandescent lights for street lights and also for cluster lights during fiscal year.

Atlantic City, N. J.—Contract for two hundred lighting standards for Arctic Ave. has been awarded to Foran Iron Construction Co., at their low bid of $26.44 each.

South Orange, N. J.—After having been without electric light contract since January, South Orange Township Committee has decided to enter into pact with Public Service Electric Co. for next five years.

Trenton, N. J.—For wiring filtration plant for lamps and motors, and also for remodeling wiring in pumping station, to Electric Construction Co., of Trenton.

Parker, S. D.—Contract for electric light plant has been awarded to E. M. Fisher & Co., of Davenport, Ia., at $19,-998.

Chattanooga, Tenn.—Commission has ratified proposed contract between city and Chattanooga Railway and Light Co. for street lighting. Contract, which goes into effect Dec. 9, 1914, provides that city shall pay $65 for flaming arcs, $60.60 for serial arcs, $45 for white way lights, $17.50 for 60-candlepower Mazda lamps, $19.80 for 80-candlepower Mazdas, $26.50 for 250-candlepower Mazdas. All public

buildings will be lighted at 5 cts. a killowat hour.

Richmond, Va.—By city, contract for three purifiers for municipal gas plant, to Stacey Mfg. Co., Elmwood, Cincinnati, O., at $16,000.

Fulton, W. Va.—It is said that work of installing electric lights for town of Fulton will be started within few days. At meeting of Fulton Council contract was awarded to West Virginia Traction & Electric Co. It is said that lights will be of 100 candlepower tungsten variety.

FIRE EQUIPMENT

Santa Ana, Cal.—Bids received for furnishing city with auto fire truck have been referred to committee of Aldermen.

Watsonville, Cal.—Fire department bonds in sum of $12,000 will be voted on Sept. 29.

Bridgeport, Conn.—Installation of new fire alarm system is being discussed.

Bridgeport, Conn.—Fire Commissioner John H. Tague has recommended to Board of Fire Commissioners that entire department in this city be equipped with motor-driven apparatus for about $30,000. Commissioner Tague's plan is to purchase tractors for steamers and new chassis for hose carts.

Stamford, Conn.—Resolution has been adopted asking Board of Appropriation and Apportionment to appropriate $1,500 for removal and reinstallation of Gamewell fire alarm system in central fire station. New installation will be improved and will protect system against stray electric curents.

Wilmington, Del.—Bids will be opened on September 23 for furnishing two automobiles for use of two assistant fire chiefs.

Washington, D. C.—A manufacturing agent in Canada desires to get in touch with dealers in combination hand and horse gas fire pumping engines for use in suburban towns and villages. References furnished. No. 13,762, Bureau of Manufactures.

New Smyrna, Fla.—Plans for new fire station and city hall for New Smyrna have been started and indications are structure will be completed and ready for occupancy within couple of months.

Americus, Ga.—City will purchase motor combination pumping engine and hose wagon as early as possible. W. P. McArthur is Chief.

Newnan, Ga.—City will buy a motor combination chemical and hose wagon during 1915. A. M. Norris is Chairman Fire Committee.

Joliet, Ill.—A triple combination wagon may be purchased next year. Calvin W. Royce is Chief.

La Salle, Ill.—Fire Marshal Bungart has asked city to purchase 500 ft. of new hose for Fire Co. No. 2, stating that hose now in use is nearly worn out. Request was referred to Fire and Light Committee.

Murphyboro, Ill.—City will shortly be in the market for motor apparatus and hose.

Indianapolis, Ind.—Resolution in favor of bond issue for erection of two fire engine houses and purchase of additional equipment has been adopted at monthly meeting of governing committee of the Indianapolis Board of Trade.

Shelbyville, Ind.—Sum of $2,000 has been appropriated for improvements to fire department, to purchase and install new alarm board, and to purchase 1,000 ft. of new hose. Bids for hose willl be opened on Oct. 6.

Cumberland, Md.—Purchase of motor combination chemical and hose wagon and tractor for ladder truck has been recommended by Chief H. Willison. Dr. T. A. K. Hummelshine is Fire Commissioner.

Saginaw, Mich.—Bids will be advertised for 1,800 ft. of 2½-in. cotton rubber lined fire hose. H. S. Gay is City Clerk.

Sault Ste Marie, Mich.—A request of Fire Chief O'Jibway for purchase of 500 feet of new fire hose has been referred to fire committee.

Trenton, N. J.—The Empire Tire & Rubber Co.'s bid of 62 9-12 cts. was lowest opened by City Commission on 2,000 ft. of 2½-in. rubber-lined double cotton jacket hose for fire department. Other bidders and proposals were: United & Globe Co., 68 cts.: Hamilton Rubber Mfg. Co., 78½ cts. While contract was not awarded. Commissioner LaBarre has stated that he would recommend that contract be awarded the Empire Co.

Dunkirk, N. Y.—About 1,000 ft. of new hose may be purchased.

Canal Dover, O.—Purchase of motor triple combination wagon is being seriously considered. H. Minor is Director of Public Safety.

Girard, O.—If Village Council is successful in disposing of $15,000 bonds which are now offered for sale, Girard will shortly possess fine new fire station, a motor truck and other fire fighting equipment.

Butler, Pa.—Fire committee has recommended purchase of 2,000 feet of hose and that repairs be made to heating boiler in central station, recommendations being approved by council.

Darby, Pa.—Darby Fire Patrol No. 2 has appointed committee to devise ways and means of obtaining auto engine. Sum of $500 has been taken from treasury and laid aside as a nucleus.

Meadville, Pa.—Fire Chief Dowdell has recommended that 1,000 ft. of 2½-in. hose be purchased.

Philadelphia, Pa.—In the new loan bill is an item of $100,000 for fire apparatus, out of which will be continued the purchase of motor driven engines and other equipment that will do away with use of horses.

West Chester, Pa.—Two steamers will be equipped with tractors in a few months. S. B. Darlington is chairman fire committee.

Williamsport, Pa.—Purchase of auto chemical apparatus is being discussed.

Providence, R. I.—Better fire protection will be advocated by Oakland Villa Improvement Association. Purchase of motor truck for Hose No. 12 is being considered.

Mount Pleasant, S. C.—Purchase of up-to-date chemical engine is being considered.

Norfolk, Va.—Purchase of additional fire equipment for Ocean View district is being considered.

Waukesha, Wis.—Chief Clancy suggests that a combination chemical, ladder and hose truck, motor driven, be purchased at price of about $5,000.

CONTRACTS AWARDED.

Hartford, Conn.—Fire Board has been authorized to contract with American-LaFrance Fire Engine Co., Elmira, N. Y., for purchase of new steam fire engine at cost not to exceed $2,800.

South Amboy, N. J.—For construction of new engine house, to Thomas B. Deats, at $2,443.

Cohoes, N. Y.—To American-La France Fire Engine Co., Elmira, N. Y., contract for motor triple combination wagon, chassis for a chemical wagon, and tractor for ladder truck.

Larchmont, N. Y.—Village will purchase American-LaFrance auto engine for $6,000, and company will take village bonds in lieu of cash for apparatus.

Cleveland, O.—To Front Drive Motor Co., Hoboken, N. J., for two Christie tractors to be attached to steamers.

San Antonio, Tex.—By council contract to the Alamo Iron Works for 6,000 ft. of Eureka 4-ply multiple-weave fire hose.

BRIDGES

Holtsville, Cal.—Bridge and sewer bond issue of $30,000 will be voted on Oct. 5.

Nicolaus, Cal.—The Sutter County Supervisors are considering construction of a $150,000 bridge across Feather River at Nicolaus and a $120,000 road from Yuba City to bridge.

Orange, Cal.—City Trustees have rejected bid of National Bank of Orange for $10,000 bridge bonds recently voted by this city. Bank's bid contained provision that bonds must be approved by one of two firms of attorneys named in bid. It was ordered that bids be readvertised, to be opened on Sept. 21.

Richmond, Cal.—County Board of Supervisors has approved plans for three steel bridges to be erected on first section of Contra Costa-Richmond State highway.

Sonora, Cal.—Bids have been advertised for by supervisors of Tuolumne County for construction of concrete bridge 112 ft. long over Sullivan's Creek, on Stent-Jacksonville road.

Watsonville, Cal.—Bridge bonds in sum of $20,000 will be voted on Sept. 29.

Willows, Cal.—Sum of $60,000 will be raised in Glenn County towards construction of bridge across Sacramento River at Princeton.

Yuba City, Cal.—Supervisors are considering construction of bridge across Feather River at Nicolaus and construction of road to connect this city with bridge. Proposed bridge will cost $150,000 and estimated cost of road is $120,000.

Atlanta, Ga.—Plans have ben made for erection of concrete bridge on Euclid Ave., betwen Waverly Way and Elizabeth St.

Macon, Ga.—See "Miscellaneous."

Morgan, Ga.—Bridge and road bond issue in sum of $100,000 will be voted on Sept 26.

Indianapolis, Ind.—Plans are being made for proposed bridge over White River at West New York St.

Muscatine, Ia.—The Muscatine county board of supervisors will pass upon resolution authorizing construction of bridge spanning Pike Creek on Muscatine to Conesville road which will cost in excess of three thousand dollars.

Leavenworth, Kan.—County Commissioners have accepted recommendation of County Engineer Thomas for 19 new culverts and bridges and instructed County Clerk Hall to advertise for them. Bridges are well distributed over county and range in price, according to engineer's estimate, from $250 to $1,050. Total estimate is $15,415. All are to be of steel and concrete construction.

Winchester, Ky.—Building of bridge across Red River Hammon's ford has been authorized.

Taunton, Mass.—Board has passed to second reading order appropriating $1,200 for new concrete bridge on Middleboro Ave. to replace so-called Barstow's bridge over Colley river.

Maryville, Mo.—A new bridge across N. Main St. gully, near Oak Hill cemetery, to replace dilapidated wood structure, probably will be erected soon by city.

Elizabeth, N. J.—Bonds in sum of $35,000 will be issued for rebuilding bridge over Rahway River at St. George's Ave., in Rahway, and bridge at Springfield Ave. in Crawford.

South Amboy, N. J.—City Council has authorized erection of Washington St. bridge.

Amsterdam, N. Y.—Common Council has decided to call special election of taxpayers, to be held on Oct. 1, to authorize borrowing of $9,582.24, cost of building temporary span of river bridge, to replace old temporary span taken out by floods last March.

Brooklyn, N. Y.—At meeting of Board of Directors of Chamber of Commerce of Borough of Queens, resolution was adopted approving new plan of Bridge Department for reconstruction of Queensboro Bridge which provides two 26-ft. roadways on different levels for vehicular traffic, and Transit Committee has been instructed to call upon Mayor Mitchel and President McAneny and urge that there be no delay in appropriation of money required for this work.

Massillon, O.—The $20,000 bonds which will provide money to pay city's share of building new viaduct across river, canal and W. & L. E. and B. & O. railroad tracks, and connect S. Erie St. with Pigeon Run Rd., have been sold to First National Bank, of this city, at par and accrued interest.

Tige, Okla.—Bridge bond issue in sum of $27,000 will be voted on Sept. 22.

CONTRACTS AWARDED.

Chico, Cal.—By Supervisors, to Chico Iron Wks., of Chico, contract for construction of bridge over Big Chico Creek, in Bidwell Park. Contract price is $1,300. Structure will connect Vallambrosia and Centennial Aves.

Chico, Cal.—For construction of concrete bridge over Honcut Creek, at Mahle's Crossing, between Butte and Yuba counties, to Jenkin and Holmes of Chico, whose bid was $3,875.

Marysville, Cal.—By Yuba County Board of Supervisors, contract for construction of bridge over Yuba River, near here, to Clinton Fireproofing Co., of San Francisco. Work on structure will begin as soon as possible and will be rushed to completion. Contract calls for expenditure of $134,000.

Marysville, Cal.—Of nine bids submitted to Supervisors for construction of proposed new D St. bridge over Yuba River at this point, that of Clinton Fireproofing Co., of San Francisco, for $134,000, has been taken under consideration.

Redding, Cal.—A 200-ft. span all-steel bridge across Pit River at McArthur, in extreme northeastern part of Shasta Co., will be constructed at cost of $10,995. Contract at that figure was let by Supervisors to William Stephens, of Redding. Other bids were: Merry-Elwell